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WO 03/103622 A1

(54) Title: STABILIZED BODY CARE PRODUCTS, HOUSEHOLD PRODUCTS, TEXTILES AND FABRICS

(57) Abstract: Disclosed are stabilized body care products, household products, textiles and fabrics which comprise certain hindered nitroxyl, hydroxylamine and hydroxylamine salt compounds. Dyed products and articles are effectively stabilized against color degradation. The products are for example skin-care products, hair-care products, dentifrices, cosmetics, laundry detergents and fabric softeners, non-detergent based fabric care products, household cleaners and textile-care products.

Stabilized Body Care Products, Household Products, Textiles And Fabrics

The present invention relates to the use of selected hindered nitroxyl, hydroxylamine and hydroxylamine salt compounds for the protection of body care products, household products, textiles and fabrics against the deleterious effects of light, heat and oxygen.

The stabilized compositions for example comprise dyes that are stabilized against color change.

Background

Co-pending U.S. application Nos. 09/830,788, filed May 1, 2002 and 09/830,787, filed May 1, 2001 are aimed at the stabilization of body care and household products.

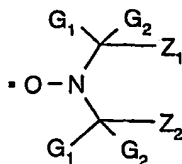
WO 01/07550 teaches the treatment of fabric with hindered amine stabilizers.

U.S. Pat. No. 6,254,724 teaches the stabilization of pulp and paper with hindered-amine based compounds.

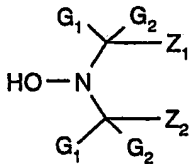
Detailed Disclosure

The present invention pertains to a stabilized composition comprising

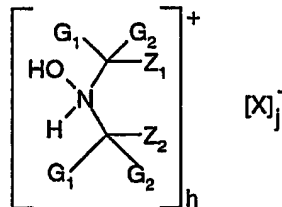
- (a) a body care product, household product, textile or fabric and
- (b) an effective stabilizing amount of at least one compound selected from the group consisting of
 - (i) hindered nitroxyl compounds of formula (I),
 - (ii) hindered hydroxylamine compounds of formula (II) and
 - (iii) hindered hydroxylamine salt compounds of formula (III)



(I)



(II)



(III)

where

G₁ and G₂ are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene,

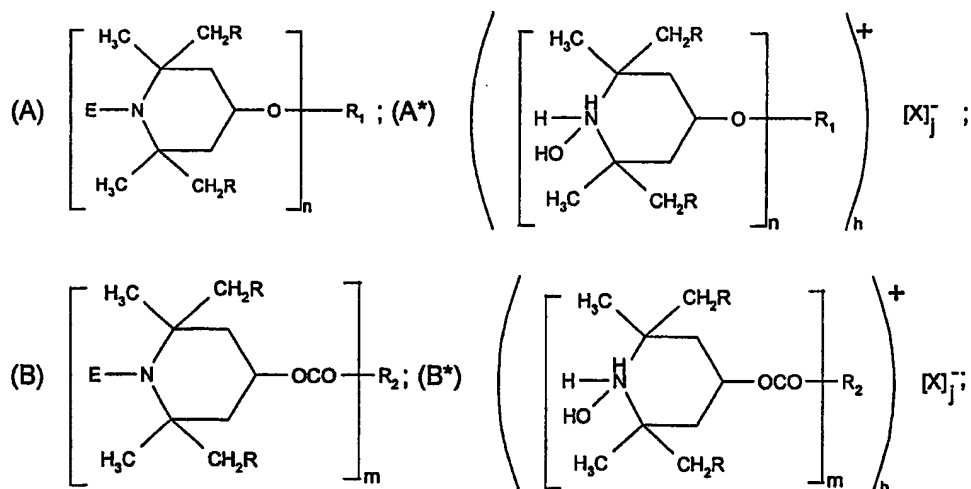
Z_1 and Z_2 are each methyl, or Z_1 and Z_2 together form a linking moiety which may additionally be substituted by an ester, ether, hydroxy, oxo, cyanohydrin, amide, amino, carboxy or urethane group,

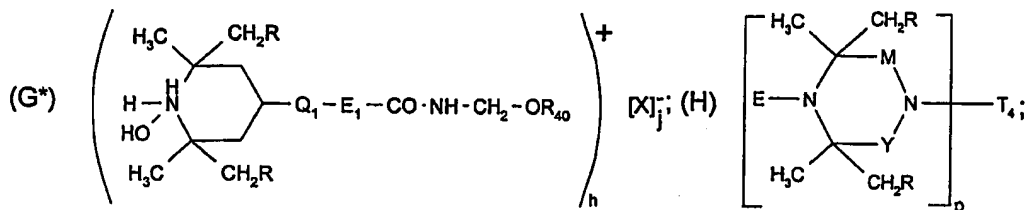
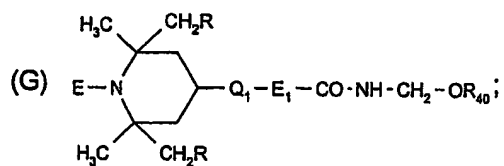
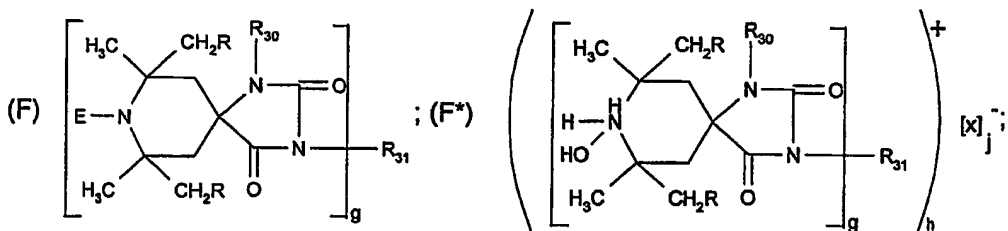
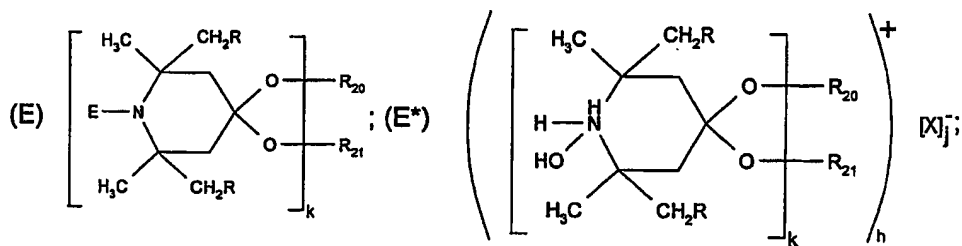
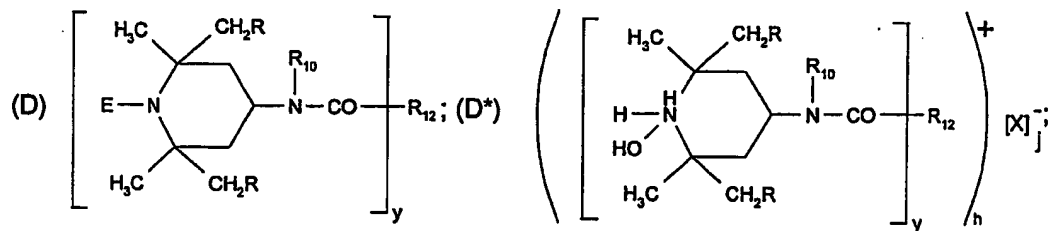
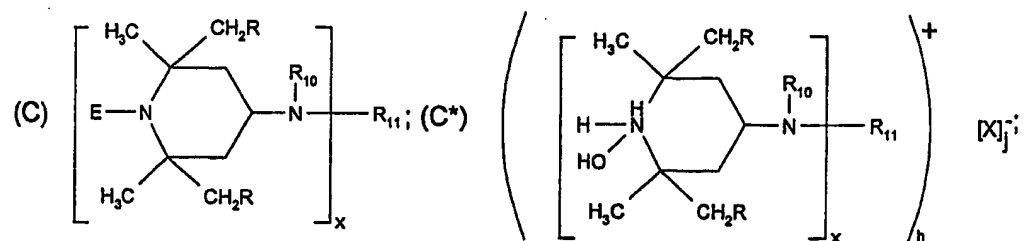
X is an inorganic or organic anion, such as phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepentamethylenephosphonate, an alkylsulfonate or an arylsulfonate, and

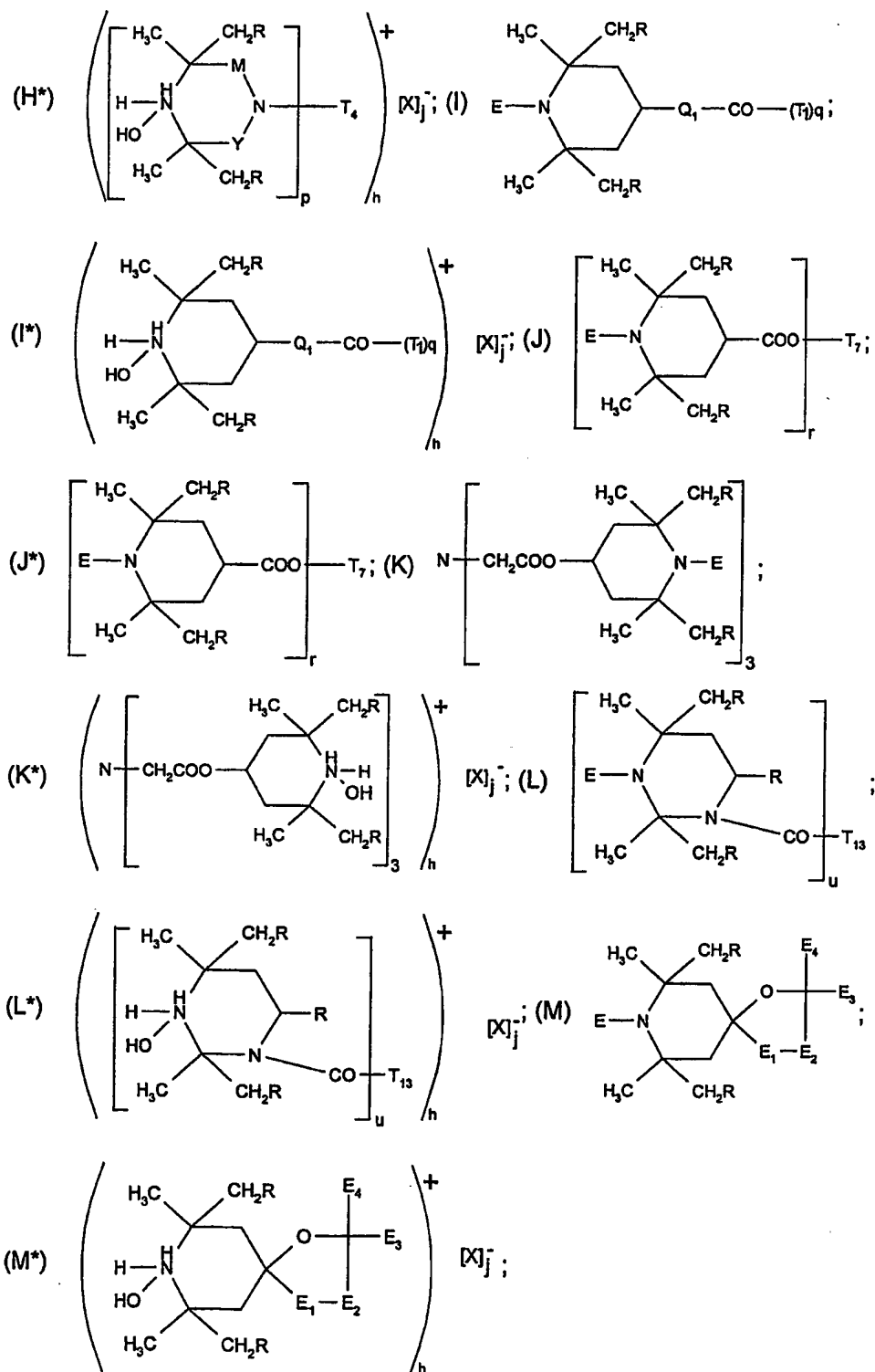
where the total charge of cations h is equal to the total charge of anions j .

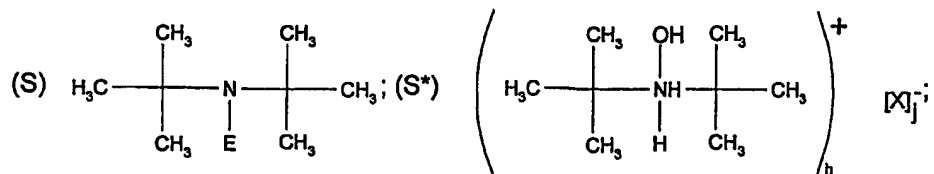
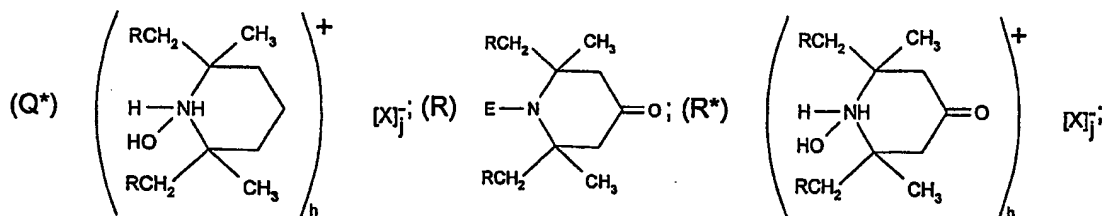
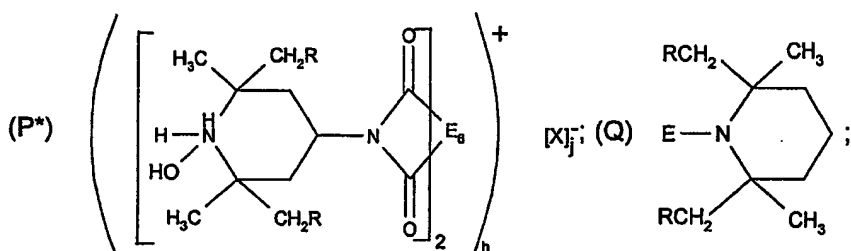
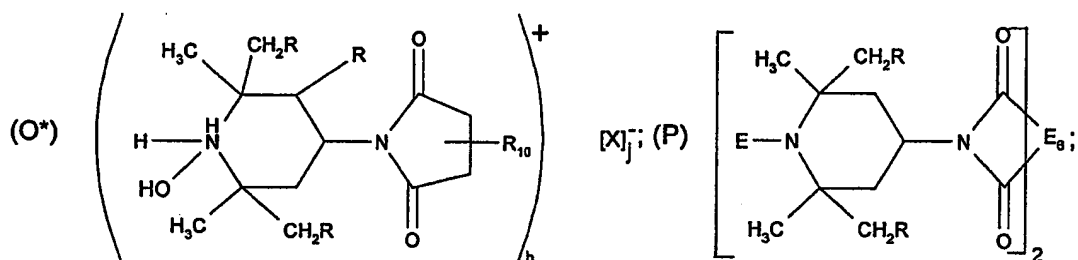
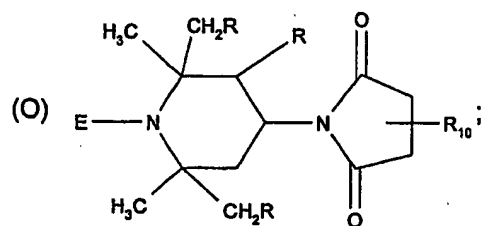
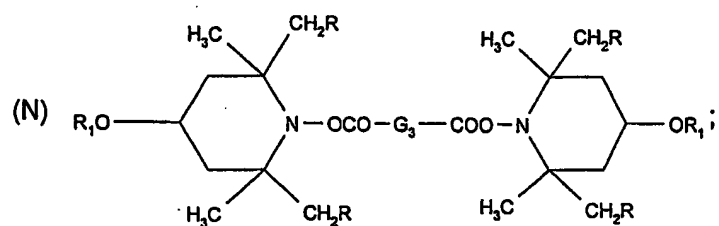
For instance, X is chloride, bisulfite, bisulfate, sulfate, phosphate, nitrate, ascorbate, acetate, citrate or carboxylate of ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid; for instance X is bisulfate or citrate.

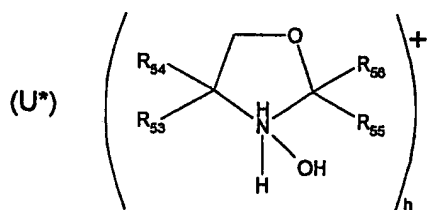
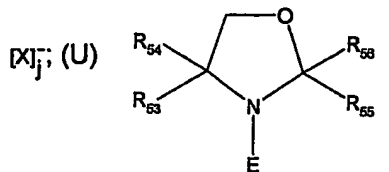
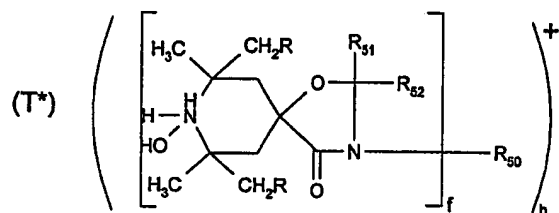
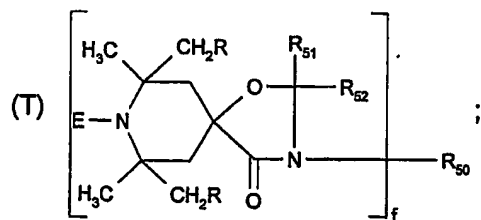
The hindered nitroxyl, hydroxylamine and hydroxylamine salt compounds of component (b) are for example of formulae A to EE and A* to EE*



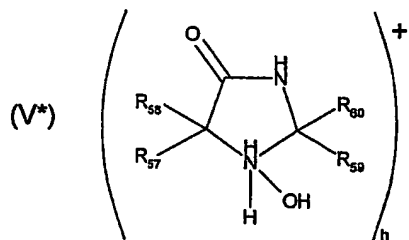
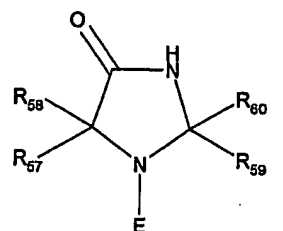




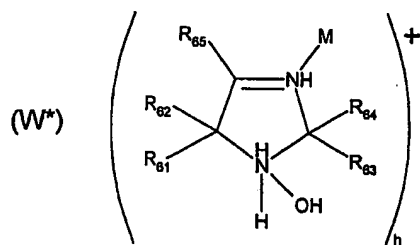
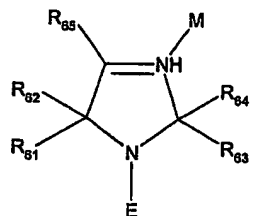




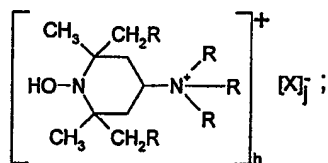
$[\text{X}]_j^-$; (V)

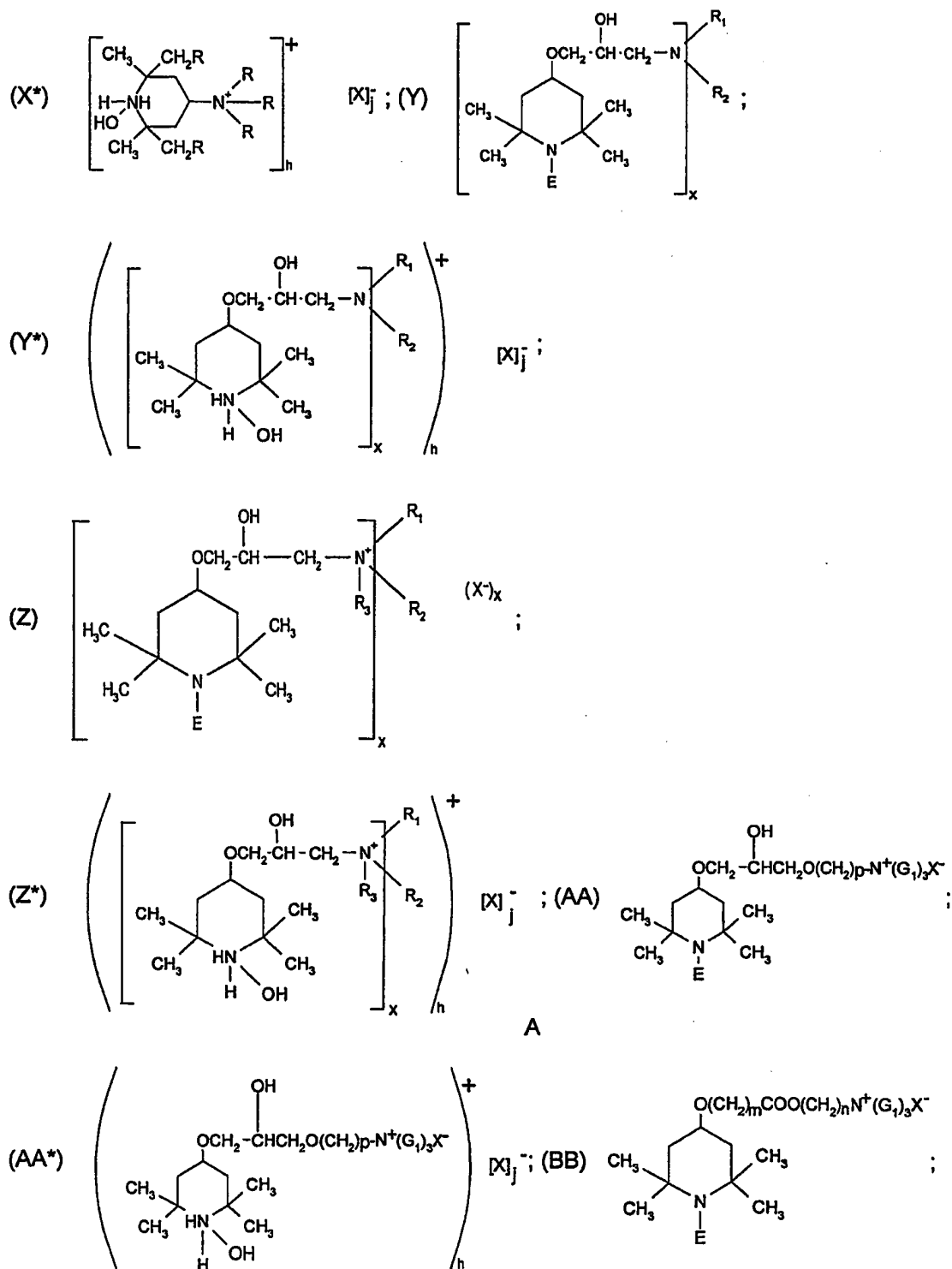


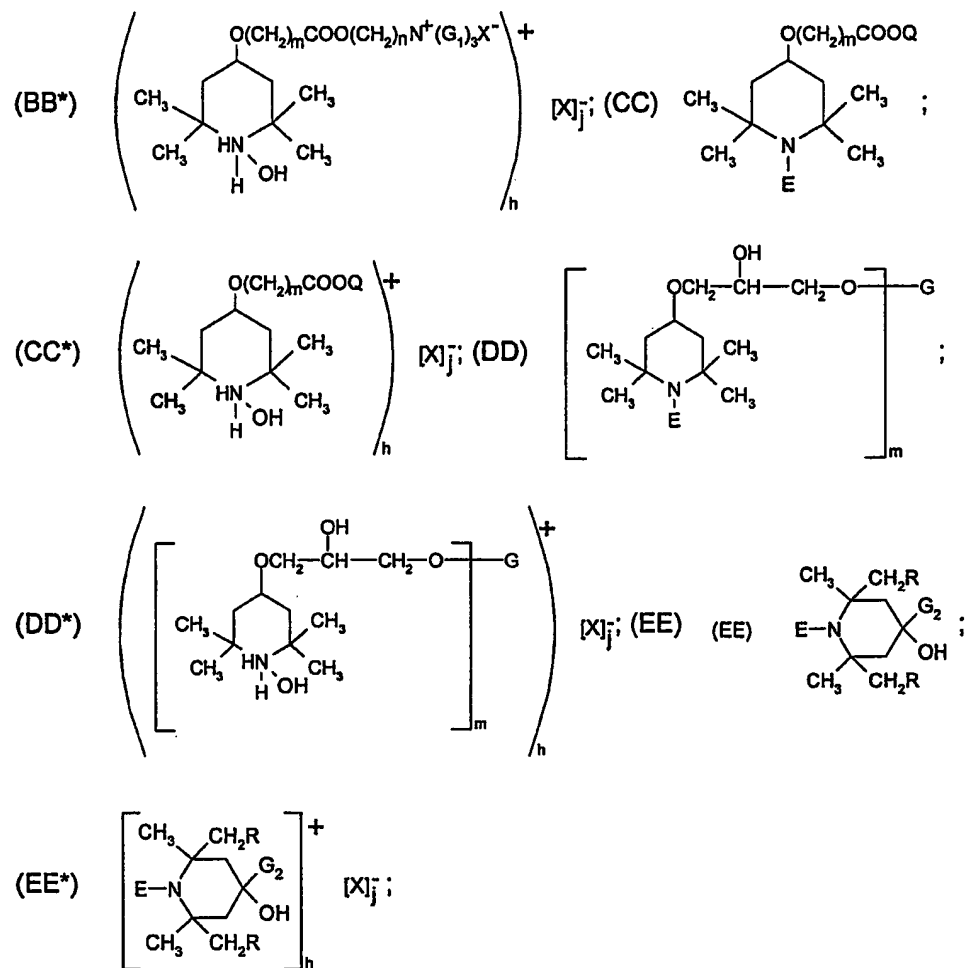
$[\text{X}]_j^-$; (W)



$[\text{X}]_j^-$; (X)







wherein

E is oxyl or hydroxyl,

R is hydrogen or methyl,

in formula A and A*,

n is 1 or 2,

when n is 1,

R₁ is hydrogen, alkyl of 1 to 18 carbon atoms, alkenyl of 2-18 carbon atoms, propargyl, glycidyl, alkyl of 2 to 50 carbon atoms interrupted by one to twenty oxygen atoms, said alkyl substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R₁ is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by -COOZ where Z is hydrogen, alkyl of 1 to 4 carbon atoms or phenyl, or where Z is said alkyl substituted by -

$(\text{COO}^-)_n \text{M}^{n+}$ where n is 1-3 and M is a metal ion from the 1st, 2nd or 3rd group of the periodic table or is Zn , Cu , Ni or Co , or M is a group $\text{N}^{n+}(\text{R}_2)_4$ where R_2 is alkyl of 1 to 8 carbon atoms or benzyl,

when n is 2,

R_1 is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylylene or alkylene of 1 to 50 carbon atoms interrupted by one to twenty oxygen atoms, substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups,

in formula B and B^* ,

m is 1 to 4,

when m is 1,

R_2 is alkyl of 1 to 18 carbon atoms, alkyl of 3 to 18 carbon atoms interrupted by $-\text{COO}-$, or R_2 is $-\text{CH}_2(\text{OCH}_2\text{CH}_2)_n\text{OCH}_3$ where n is 1 to 12, or

R_2 is cycloalkyl of 5 to 12 carbon atoms, aryl of 6 to 12 carbon atoms, or said aryl substituted by one to four alkyl groups of 1 to 4 carbon atoms, or

R_2 is $-\text{NHR}_3$ where R_3 is alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aryl of 6 to 12 carbon atoms, or said aryl substituted by one to four alkyl of 1 to 4 carbon atoms, or

R_2 is $-\text{N}(\text{R}_3)_2$ where R_3 is as defined above,

when m is 2,

R_2 is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylylene, alkylene of 2 to 12 carbon atoms interrupted by $-\text{COO}-$, or R_2 is $-\text{CH}_2(\text{OCH}_2\text{CH}_2)_n\text{OCH}_2-$ where n is 1 to 12, or

R_2 is cycloalkylene of 5 to 12 carbon atoms, aralkylene of 7 to 15 carbon atoms or arylene of 6 to 12 carbon atoms, or

R_2 is $-\text{NHR}_4\text{NH}-$ where R_4 is alkylene of 2 to 18 carbon atoms, cycloalkylene of 5 to 12 carbon atoms, aralkylene of 8 to 15 carbon atoms or arylene of 6 to 12 carbon atoms, or

R_2 is $-\text{N}(\text{R}_3)\text{R}_4\text{N}(\text{R}_3)-$ where R_3 and R_4 are as defined above, or

R_2 is $-\text{CO}-$ or $-\text{NH}-\text{CO}-\text{NH}-$,

when m is 3,

R_2 is alkanetriyl of 3 to 8 carbon atoms or benzenetriyl, or

when m is 4,

R_2 is alkanetetrayl of 5 to 8 carbon atoms or benzenetetrayl,

in formula C and C^* ,

R_{10} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, alkanoyl of 2 to 18 carbon atoms, alkenoyl of 3 to 5 carbon atoms or benzoyl,

x is 1 or 2,

when x is 1,

R_{11} is hydrogen, alkyl of 1 to 18 carbon atoms, alkenyl of 2 to 18 carbon atoms, propargyl, glycidyl, alkyl of 2 to 50 carbon atoms interrupted by one to twenty oxygen atoms, said alkyl substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R_{11} is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $-\text{COOZ}$ where Z is hydrogen, alkyl of 1 to 4 carbon atoms or phenyl, or where Z is said alkyl substituted by $-(\text{COO}^-)_n\text{M}^{n+}$ where n is 1-3 and M is a metal ion from the 1st, 2nd or 3rd group of the periodic table or is Zn, Cu, Ni or Co, or M is a group $\text{N}^{n+}(\text{R}_2)_4$ where R_2 is hydrogen, alkyl of 1 to 8 carbon atoms or benzyl, or

when x is 2,

R_{11} is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylylene or alkylene of 1 to 50 carbon atoms interrupted by one to twenty oxygen atoms, substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups,

in formula D and D^* ,

R_{10} is as defined above,

y is 1 to 4, and

R_{12} is defined as R_2 above

in formula E and E^* ,

k is 1 or 2,

when k is 1,

R_{20} and R_{21} are independently alkyl of 1 to 12 carbon atoms, alkenyl of 2 to 12 carbon atoms or aralkyl of 7 to 15 carbon atoms, or R_{20} is also hydrogen, or

R_{20} and R_{21} together are alkylene of 2 to 8 carbon atoms or said alkylene substituted by hydroxyl, or are acyloxy-alkylene of 4 to 22 carbon atoms, or

when k is 2,

R_{20} and R_{21} are together $(-\text{CH}_2)_2\text{C}(\text{CH}_2-)_2$,

in formula F and F^* ,

R_{30} is hydrogen, alkyl of 1 to 18 carbon atoms, benzyl, glycidyl, or alkoxyalkyl of 2 to 6 carbon atoms,
 g is 1 or 2,
when g is 1, R_{31} is defined as R_1 above when n is 1,
when g is 2, R_{31} is defined as R_1 above when n is 2,
in formula G and G^* ,
 Q_1 is $-NR_{41}-$ or $-O-$,
 E_1 is alkylene of 1 to 3 carbon atoms, or E_1 is $-\text{CH}_2-\text{CH}(R_{42})-\text{O}-$ where R_{42} is hydrogen, methyl or phenyl, or E_1 is $-(\text{CH}_2)_3-\text{NH}-$ or E_1 is a direct bond,
 R_{40} is hydrogen or alkyl of 1 to 18 carbon atoms,
 R_{41} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms, or R_{41} is $-\text{CH}_2-\text{CH}(R_{42})-\text{OH}$ where R_{42} is as defined above,
in formula H and H^* ,
 p is 1 or 2,
 T_4 is as defined for R_{11} when x is 1 or 2,
 M and Y are independently methylene or carbonyl, for instance M is methylene and Y is carbonyl,
in formula I and I^* ,
this formula denotes a recurring structural unit of a polymer where T_1 is ethylene or 1,2-propylene or is the repeating structural unit derived from an alpha-olefin copolymer with an alkyl acrylate or methacrylate, and where
 q is 2 to 100,
 Q_1 is $-N(R_{41})-$ or $-O-$ where R_{41} is as defined above,
in formula J and J^* ,
 r is 1 or 2,
 T_7 is as defined for R_1 when n is 1 or 2 in formula A,
for example T_7 is octamethylene when r is 2,
in formula L and L^* ,
 u is 1 or 2,
 T_{13} is as defined for R_1 when n is 1 or 2 in formula A, with the proviso that T_{13} is not hydrogen when u is 1,
in formula M and M^* ,

E_1 and E_2 , being different, each are $-\text{CO}-$ or $-\text{N}(\text{E}_5)-$ where E_5 is hydrogen, alkyl of 1 to 12 carbon atoms or alkoxy carbonylalkyl of 4 to 22 carbon atoms, for instance E_1 is $-\text{CO}-$ and E_2 is $-\text{N}(\text{E}_5)-$,

E_3 is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl, said phenyl or said naphthyl substituted by chlorine or by alkyl of 1 to 4 carbon atoms, or phenylalkyl of 7 to 12 carbon atoms, or said phenylalkyl substituted by alkyl of 1 to 4 carbon atoms,

E_4 is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl or phenylalkyl of 7 to 12 carbon atoms, or

E_3 and E_4 together are polymethylene of 4 to 17 carbon atoms, or said polymethylene substituted by one to four alkyl of 1 to 4 carbon atoms, for example methyl,

in formula N,

R_1 is as defined for R_1 in formula A when n is 1,

G_3 is a direct bond, alkylene of 1 to 12 carbon atoms, phenylene or $-\text{NH}-\text{G}_1-\text{NH}-$ where G_1 is alkylene of 1 to 12 carbon atoms,

in formula O and O^* ,

R_{10} is as defined for R_{10} in formula C,

in formula P and P^* ,

E_6 is an aliphatic or aromatic tetravalent radical, for example neopentetetrayl or benzenetetrayl,

in formula T and T^* ,

R_{51} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, or aryl of 6 to 10 carbon atoms,

R_{52} is hydrogen or alkyl of 1 to 18 carbon atoms, or

R_{51} and R_{52} together of alkylene of 4 to 8 carbon atoms,

f is 1 or 2,

when f is 1,

R_{50} is as defined for R_{11} in formula C when x is 1, or R_{50} is $-(\text{CH}_2)_z\text{COOR}_{54}$ where z is 1 to 4 and R_{54} is hydrogen or alkyl of 1 to 18 carbon atoms, or R_{54} is a metal ion from the 1st, 2nd or 3rd group of the periodic table or a group $-\text{N}(\text{R}_{55})_4$ where R_{55} is hydrogen, alkyl of 1 to 12 carbon atoms or benzyl,

when f is 2, R_{50} is as defined for R_{11} in formula C when x is 2,

in formula U and U^* ,

R_{53} , R_{54} , R_{55} and R_{56} are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene.

in formula V and V*,

R₅₇, R₅₈, R₅₉ and R₆₀ are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene.

in formula W and W*,

R₆₁, R₆₂, R₆₃ and R₆₄ are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene,

R₆₅ is alkyl of 1 to 5 carbon atoms,

M is hydrogen or oxygen,

wherein in formulas X to CC and X* to CC*

n is 2 to 3,

G₁ is hydrogen, methyl, ethyl, butyl or benzyl,

m is 1 to 4,

x is 1 to 4,

when x is 1,

R₁ and R₂ are independently alkyl of 1 to 18 carbon atoms, said alkyl interrupted by one to five oxygen atoms, said alkyl substituted by 1 to 5 hydroxyl groups or said alkyl both interrupted by said oxygen atoms and substituted by said hydroxyl groups; cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms or said aryl substituted by one to three alkyl of 1 to 8 carbon atoms, or R₁ is also hydrogen, or R₁ and R₂ are together tetramethylene, pentamethylene, hexamethylene or 3-oxapentamethylene,

when x is 2,

R₁ is hydrogen, alkyl of 1 to 8 carbon atoms, said alkyl interrupted by one or two oxygen atoms, said alkyl substituted by a hydroxyl group, or said alkyl both interrupted by one or two oxygen atoms and substituted by a hydroxyl group,

R₂ is alkylene of 2 to 18 carbon atoms, said alkylene interrupted by one to five oxygen atoms, said alkylene substituted by 1 to 5 hydroxyl groups or said alkylene both interrupted by said oxygen atoms and substituted by said hydroxyl groups; o-, m- or p-phenylene or said phenylene substituted by one or two alkyl of 1 to 4 carbon atoms, or

R₂ is $-(CH_2)_kO[(CH_2)_kO]_h(CH_2)_k-$ where k is 2 to 4 and h is 1 to 40, or

R₁ and R₂ together with the two N atoms to which they are attached are piperazin-1,4-diyl,

when x is 3,

R₁ is hydrogen

R₂ is alkylene of 4 to 8 carbon atoms interrupted by one nitrogen atom,

when x is 4,

R_1 is hydrogen,

R_2 is alkylene of 6 to 12 carbon atoms interrupted by two nitrogen atoms,

R_3 is hydrogen, alkyl of 1 to 8 carbon atoms, said alkyl interrupted by one or two oxygen atoms, said alkyl substituted by a hydroxyl group, or both interrupted by one or two oxygen atoms and substituted by a hydroxyl group,

P is 2 or 3, and

Q is an alkali metal salt, ammonium or $N^+(G_1)_4$

in formula DD and DD*

m is 2 or 3,

when m is 2,

G is $-(CH_2CHR-O)_rCH_2CHR-$, where r is 0 to 3, and R is hydrogen or methyl, and

when m is 3,

G is glyceryl,

in formula EE and EE*

G_2 is -CN, -CONH₂ or -COOG₃ where G_3 is hydrogen, alkyl of 1 to 18 carbon atoms or phenyl,

X is an inorganic or organic anion, such as phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepentamethylenephosphonate, an alkylsulfonate or an arylsulfonate, and

where the total charge of cations h is equal to the total charge of anions j.

For example, the compounds of component (b) are those of formulas A, A*, B, B*, C, C*, D, D*, Q, Q*, R, R*, S, S*, X, X*, Y, Y*, Z and Z*,

R is hydrogen,

in formula A and A*

n is 1 or 2,

when n is 1,

R_1 is hydrogen, alkyl of 1 to 6 carbon atoms, alkenyl of 2-6 carbon atoms, propargyl, glycidyl, alkyl of 2 to 20 carbon atoms interrupted by one to ten oxygen atoms, said alkyl

substituted by one to five hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R_1 is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $-COOZ$ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when n is 2,

R_1 is alkylene of 1 to 8 carbon atoms, alkenylene of 4 to 8 carbon atoms, alkylene of 1 to 20 carbon atoms interrupted by one to ten oxygen atoms, substituted by one to five hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups,

in formula B and B*

m is 1 or 2

when m is 1,

R_2 is alkyl of 1 to 4 carbon atoms or R_2 is $CH_2(OCH_2CH_2)_nOCH_3$ where n is 1 to 12, or

R_2 is phenyl, or said phenyl substituted by one to three methyl groups,

R_2 is $-NHR_3$ where R_3 is alkyl of 1 to 4 carbon atoms or phenyl, or said phenyl substituted by one or two methyl groups,

when m is 2,

R_2 is alkylene of 1 to 8 carbon atoms, alkenylene of 4 to 8 carbon atoms, or R_2 is $-CH_2(OCH_2CH_2)_nOCH_2-$ where n is 1 to 12,

R_2 is NHR_4NH where R_4 is of 2 to 6 carbon atoms, aralkylene of 8 to 15 carbon atoms or arylene of 6 to 12 carbon atoms,

R_2 is $-CO-$ or $-NHCONH$,

in formula C and C*,

R_{10} is hydrogen or, alkanoyl of 1 to 3 carbon atoms,

x is 1 or 2,

when x is 1,

R_{11} is hydrogen, alkyl of 1 to 6 carbon atoms or glycidyl,

R_{11} is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $COOZ$ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when x is 2,

R_{11} is alkylene of 1 to 6 carbon atoms,

in formula D and D*,

R_{10} is hydrogen,

y is 1 or 2,

R₁₂ is defined as R₂ above,

in formula Y, Y*, Z and Z*,

x is 1 or 2,

when x is 1,

R₁ and R₂ are independently alkyl of 1 to 4 carbon atoms,

or R₁ and R₂ are together tetramethylene, or pentamethylene,

R₂ is hydrogen or alkyl of 1 to 4 carbon atoms, said alkyl group substituted by a hydroxyl group,

when x is 2,

R₁ is hydrogen, alkyl of 1 to 4 carbon atoms, said alkyl substituted by a hydroxyl group,

R₂ is alkylene of 2 to 6 carbon atoms,

R₃ is as defined above.

For instance, the compounds of component (b) are those of formulas A, A*, B, B*, C, C*, D, D*, Q, Q*, R and R*,

R is hydrogen,

in formula A and A*,

h is 1,

R₁ is hydrogen, alkyl of 1 to 4 carbon atoms, glycidyl, alkyl of 2 to 4 carbon atoms interrupted by one or two oxygen atoms, said alkyl substituted by one or two hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R₁ is alkyl of 1 to 4 carbon atoms substituted by -COOZ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

in formula B and B*,

m is 1 or 2,

R₂ is alkyl of 1 to 4 carbon atoms or R₂ is CH₂(OCH₂CH₂)_nOCH₃ where n is 1 to 4,

when m is 2,

R₂ is alkylene of 1 to 8 carbon atoms,

in formula C and C*,

R₁₀ is hydrogen or alkanoyl of 1 or 2 carbon atoms,

x is 1 or 2,

when x is 1,

R₁₁ is hydrogen, alkyl of 1 to 4 carbon atoms or glycidyl,

R₁₁ is alkyl of 1 to 4 carbon atoms substituted by COOZ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when x is 2,

R₁₁ is alkylene of 1 to 6 carbon atoms,

in formula D and D*,

R₁₀ is hydrogen,

y is 1 or 2,

R₁₂ is defined as R₂ above.

For instance, the hindered nitroxyl, hydroxylamine and hydroxylamine salt compounds of component (b) are selected from bis(1-oxyl-2,2,6,6-tetramethylpiperidin-4-yl) sebacate; bis(1-hydroxy-2,2,6,6-tetramethylpiperidin-4-yl) sebacate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium citrate; 1-oxyl-2,2,6,6-tetramethyl-4-acetamidopiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium bisulfate; 1-oxyl-2,2,6,6-tetramethyl-4-oxo-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-methoxy-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-methoxy-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-methoxy-piperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-acetoxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidine; 1-oxyl-2,2,6,6-tetramethyl-4-propoxy-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-propoxy-piperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-propoxy-piperidine; 1-oxyl-2,2,6,6-tetramethyl-4-(2-hydroxy-4-oxapentoxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-(2-hydroxy-4-oxapentoxypiperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium chloride; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium bisulfate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) ethylenediaminetetraacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) diethylenetriaminepentaacetate; tri(1-hydroxy-2,2,6,6-

tetramethyl-4-hydroxypiperidinium) nitrilotriacetate; tri(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) nitrilotriacetate; tri(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) nitrilotriacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentamethylenephosphonate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentamethylenephosphonate; and penta(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) diethylene-triaminepentamethylenephosphonate.

For example, the hindered nitroxyl, hydroxylamine and hydroxylamine salt compounds of component (b) are selected from 1-oxyl-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium chloride; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium bisulfate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) ethylenediaminetetraacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentaacetate; and penta(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) diethylenetriaminepentaacetate.

For example, the compounds of component (b) are selected from 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium

DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA and tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA.

The above named counter-ions are ethylenediaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA), hydroxyethylethylenediaminetriacetic acid (HEDTA), nitrilotriacetic acid (NTA) or diethylenetriaminepentamethylenephosphonic acid (DTPMPA).

The present compositions may comprise further traditional additives, for example ultraviolet (UV) light absorbers and antioxidants.

Accordingly, the present invention further pertains to a stabilized composition comprising
(a) a body care product, household product, textile or fabric,

- (b) an effective stabilizing amount of at least one compound selected from the group consisting of
- (i) hindered nitroxyl compounds of formula (I),
 - (ii) hindered hydroxylamine compounds of formula (II) and
 - (iii) hindered hydroxylamine salt compounds of formula (III) and
- (c) at least one compound selected from the group consisting of the ultraviolet light absorbers, antioxidants, tocopherol, tocopherol acetate, hindered amine light stabilizers, complex formers, optical brighteners, surfactants, and polyorganosiloxanes.

The additional additives of present component (c) are for example those disclosed in co-pending U.S. application Nos. 09/830,788, filed May 1, 2001 and 09/830,787, filed May 1, 2001. The disclosures of these co-pending applications are hereby incorporated by reference.

The UV absorbers are for example selected from group consisting of the 2H-benzotriazoles, the s-triazines, the benzophenones, the α -cyanoacrylates, the oxanilides, the benzoxazinones, the benzoates and the α -alkyl cinnamates.

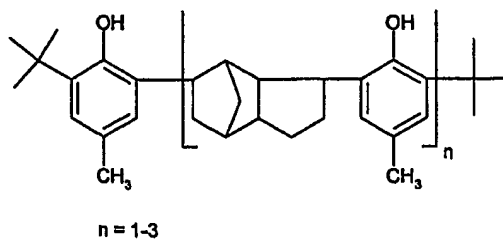
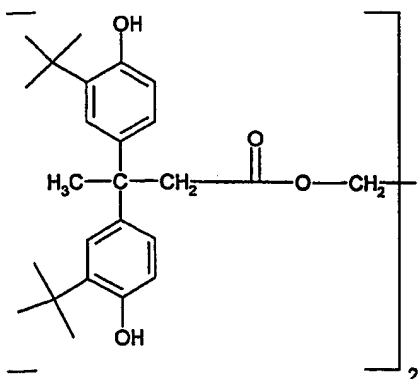
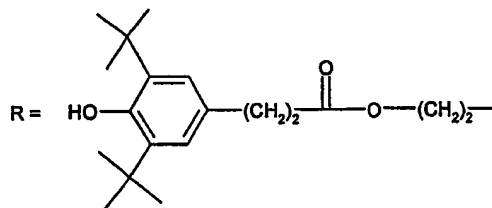
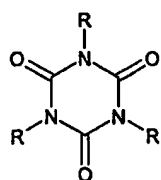
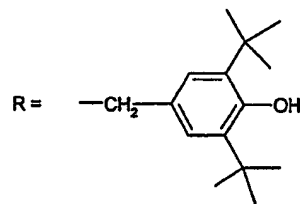
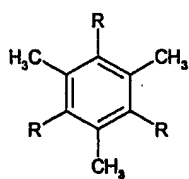
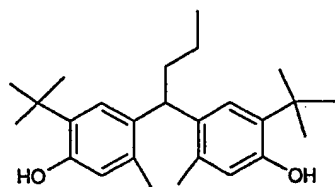
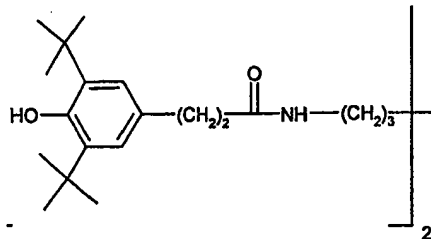
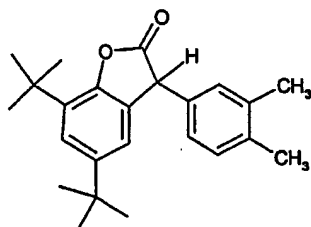
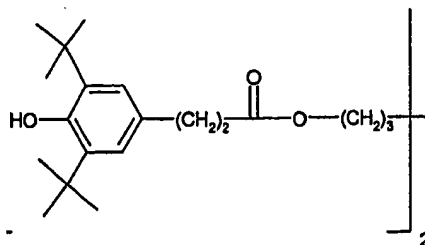
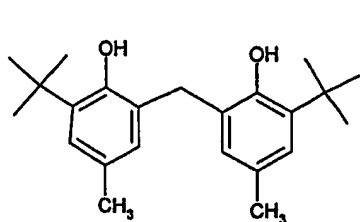
The UV absorbers are for example 2,4,6-tris(2-hydroxy-4-octyloxyphenyl)-1,3,5-triazine; 2-(2,4-dihydroxyphenyl)-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine; 2,4-bis(2-hydroxy-4-propyloxyphenyl)-6-(2,4-dimethylphenyl)-1,3,5-triazine; 2-(2-hydroxy-4-octyloxyphenyl)-4,6-bis(4-methylphenyl)-1,3,5-triazine; 2-(2-hydroxy-4-dodecyloxyphenyl)-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine; 2-[2-hydroxy-4-(2-hydroxy-3-butyloxypropyloxy)phenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine; 2-[2-hydroxy-4-(2-hydroxy-3-octyloxypropyloxy)phenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine; 2-[2-hydroxy-4-(2-hydroxy-3-tridecyloxy-propyloxy)phenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine; 5-chloro-2-(2-hydroxy-3,5-di-tert-butylphenyl)-2H-benzotriazole; 2-(2-hydroxy-3-dodecyl-5-methylphenyl)-2H-benzotriazole; 5-chloro-2-(2-hydroxy-3-tert-butyl-5-methylphenyl)-2H-benzotriazole; bis-(3-(2H-benzotriazol-2-yl)-2-hydroxy-5-tert-octyl)methane; 2-(2-hydroxy-3,5-di-tert-butylphenyl)-2H-benzotriazole; 2-(2-hydroxy-3,5-di-tert-amylphenyl)-2H-benzotriazole; 2-(2-hydroxy-3,5-di- α -cumylphenyl)-2H-benzotriazole; 2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole; 2-(2-hydroxy-5-tert-octylphenyl)-2H-benzotriazole; 3-(2H-benzotriazol-2-yl)-4-hydroxy-5-(1-methylpropyl)-benzenesulfonic acid monosodium salt; 3-tert-butyl-4-hydroxy-5-(2H-benzotriazol-2-yl)-hydrocinnamic acid and sodium salt; 12-hydroxy-3,6,9-trioxadodecyl 3-tert-butyl-4-hydro-

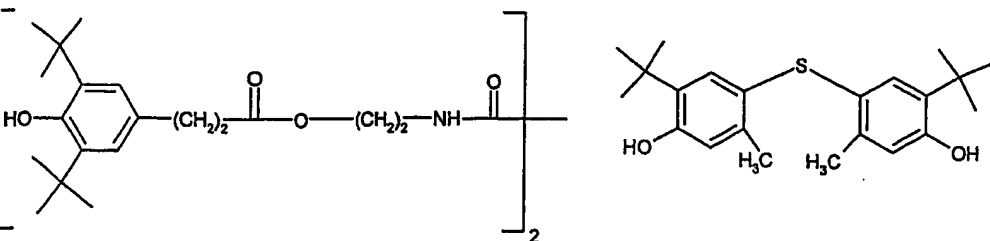
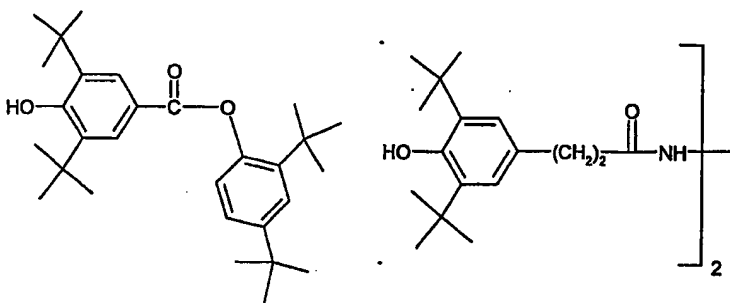
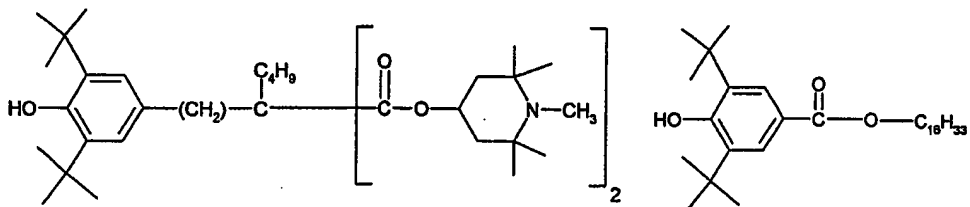
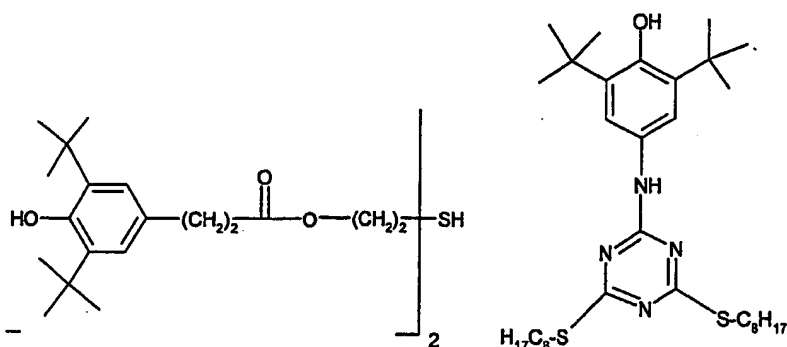
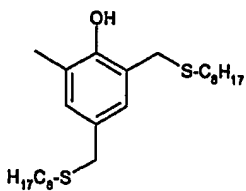
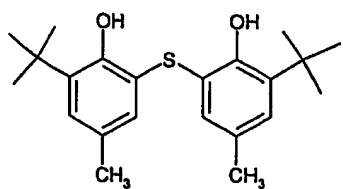
xy-5-(2H-benzotriazol-2-yl)-hydrocinnamate; octyl 3-tert-butyl-4-hydroxy-5-(2H-benzotriazol-2-yl)-hydrocinnamate; 4,6-bis(2,4-dimethylphenyl)-2-(4-(3-dodecyloxy*-2-hydroxypropoxy)-2-hydroxyphenyl)-s-triazine (*is mixture of C₁₂₋₁₄oxy isomers); 4,6-bis(2,4-dimethylphenyl)-2-(4-octyloxy-2-hydroxyphenyl)-s-triazine; 2,4-dihydroxybenzophenone; 2,2'-dihydroxy-4,4'-dimethoxy-5,5'-disulfobenzophenone, disodium salt; 2-hydroxy-4-octyloxybenzophenone; 2-hydroxy-4-dodecyloxybenzophenone; 2,4-dihydroxybenzophenone; 2,2',4,4'-tetrahydroxybenzophenone; 4-aminobenzoic acid; 2,3-dihydroxypropyl-4-aminobenzoic acid; 3-(4-imidazolyl)acrylic acid; 2-phenyl-5-benzimidazole sulfonic acid; N,N,N-trimethyl- α -(2-oxo-3-boronylidene)-p-toluidinium methyl sulfate; 5-benzoyl-4-hydroxy-2-methoxybenzenesulfonic acid, sodium salt; 3-(4-benzoyl-3-hydroxyphenoxy)-2-hydroxy-N,N,N-trimethyl-1-propanaminium chloride; 3-[4-(2H-benzotriazol-2-yl)-3-hydroxyphenoxy]-2-hydroxy-N,N,N-trimethyl-1-propanaminium, chloride; 2-(2-hydroxy-5-methylphenyl)-2H-benzotriazole; and 2,2'-dihydroxy-4,4'-dimethoxybenzophenone (Uvinul® 3049).

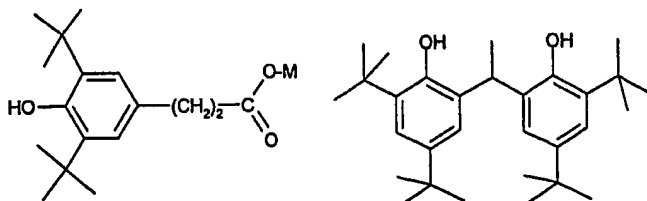
For instance, suitable UV absorbers are selected from 3-(2H-benzotriazol-2-yl)-4-hydroxy-5-(1-methylpropyl)-benzenesulfonic acid monosodium salt; 3-tert-butyl-4-hydroxy-5-(2H-benzotriazol-2-yl)-hydrocinnamic acid and sodium salt; 2-(2-hydroxy-3,5-di-tert-butylphenyl)-2H-benzotriazole; 2-(2-hydroxy-3,5-di-tert-amylphenyl)-2H-benzotriazole; 4,6-bis(2,4-dimethylphenyl)-2-(4-(3-dodecyloxy*-2-hydroxypropoxy)-2-hydroxyphenyl)-s-triazine (*is mixture of C₁₂₋₁₄oxy isomers); 12-hydroxy-3,6,9-trioxadodecyl 3-tert-butyl-4-hydroxy-5-(2H-benzotriazol-2-yl)-hydrocinnamate; 2,4-dihydroxybenzophenone; 2,2'-dihydroxy-4,4'-dimethoxy-5,5'-disulfobenzophenone, disodium salt; 2,2',4,4'-tetrahydroxybenzophenone; 3-(4-benzoyl-3-hydroxyphenoxy)-2-hydroxy-N,N,N-trimethyl-1-propanaminium chloride; 3-[4-(2H-benzotriazol-2-yl)-3-hydroxyphenoxy]-2-hydroxy-N,N,N-trimethyl-1-propanaminium, chloride; 5-benzoyl-4-hydroxy-2-methoxy-benzenesulfonic acid, sodium salt; and 2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole.

Additional suitable antioxidants are for example selected from the hindered phenolic and benzofuranone stabilizers.

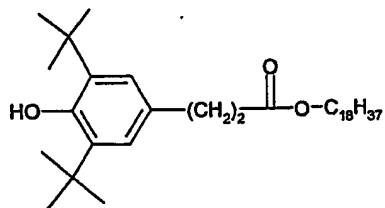
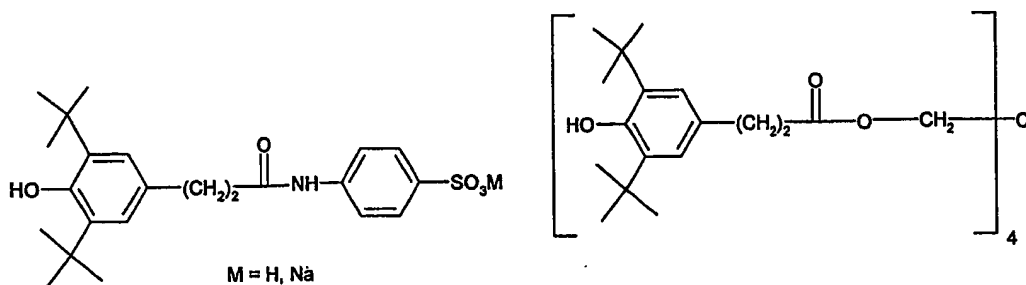
Suitable antioxidants are for example selected from the group consisting of



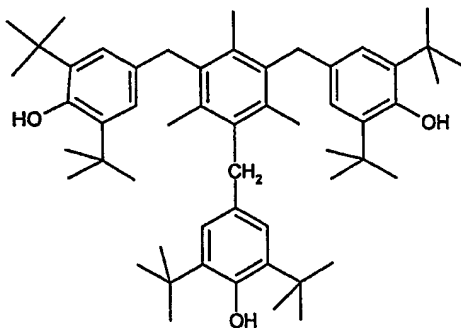




M = H, ammonium, alkali

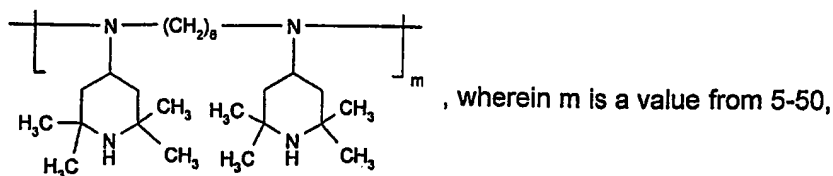


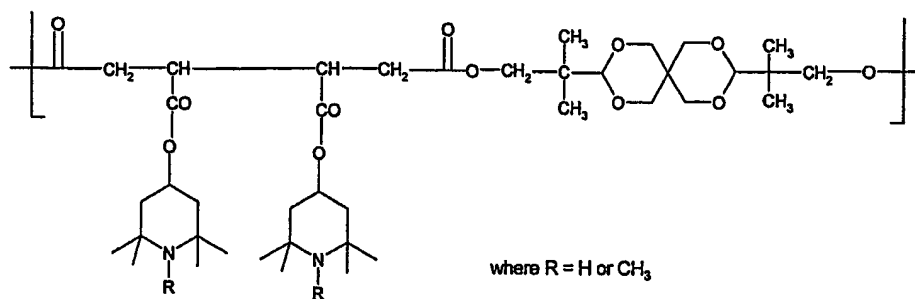
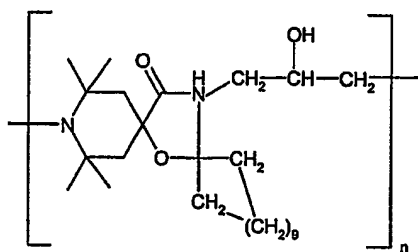
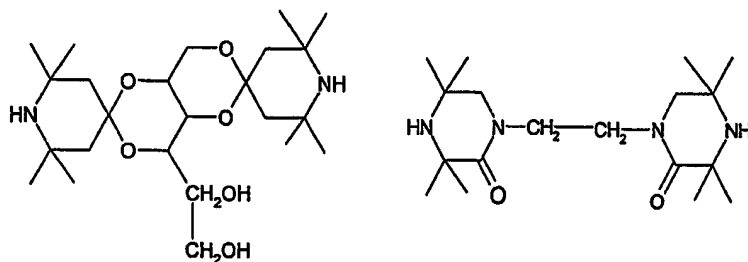
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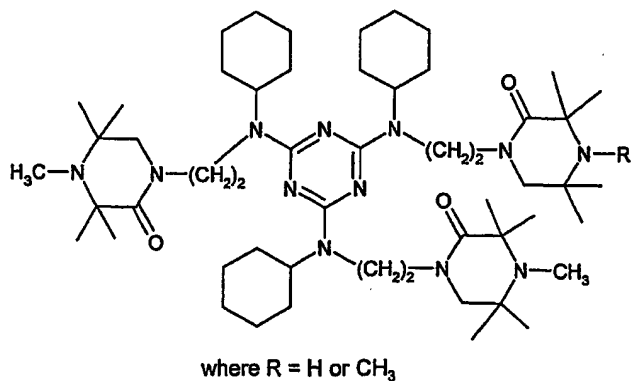
The hindered amine light stabilizers (HALS) of component (c) are for example known commercial compounds. They are for example selected from the group consisting of bis(2,2,6,6-tetramethylpiperidin-4-yl)sebacate, bis(2,2,6,6-tetramethylpiperidin-4-yl)succinate, bis(1,2,2,6,6-pentamethylpiperidin-4-yl)sebacate, n-butyl-3,5-di-tert-butyl-4-hydroxybenzyl-malonic acid-bis(1,2,2,6,6-pentamethylpiperidin-4-yl)ester, the condensate of 1-hydroxyethyl-2,2,6,6-tetramethyl-4-hydroxypiperidine and succinic acid, the condensate of N,N'-

bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-tert-octylamino-2,6-dichloro-1,3,5-s-triazine, tris(2,2,6,6-tetramethyl-4-piperidyl)nitrilotriacetate, tetrakis(2,2,6,6-tetramethyl-4-piperidyl)-1,2,3,4-butanetetraoate, 1,1'-(1,2-ethanediyl)-bis(3,3,5,5-tetramethylpiperazinone), 4-benzoyl-2,2,6,6-tetramethylpiperidine, 4-stearyloxy-2,2,6,6-tetramethylpiperidine, bis(1,2,2,6,6-pentamethylpiperidyl)-2-n-butyl-2-(2-hydroxy-3,5-di-tert-butylbenzyl)malonate, 3-n-octyl-7,7,9,9-tetramethyl-1,3,8-triazaspiro[4.5]decane-2,4-dione, the condensate of N,N-bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-morpholino-2,6-dichloro-1,3,5-triazine, the condensate of 2-chloro-4,6-di(4-n-butylamino-2,2,6,6-tetramethylpiperidyl)-1,3,5-triazine and 1,2-bis(3-aminopropylamino)ethane, the condensate of 2-chloro-4,6-di(4-n-butylamino-1,2,2,6,6-pentamethylpiperidyl)-1,3,5-triazine and 1,2-bis(3-aminopropylamino)ethane, 8-acetyl-3-dodecyl-7,7,9,9-tetramethyl-1,3,8-triazaspiro[4.5]decane-2,4-dione, 3-dodecyl-1-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidin-2,5-dione, 3-dodecyl-1-(1,2,2,6,6-pentamethyl-4-piperidyl)-pyrrolidine-2,5-dione, a mixture of 4-hexadecyloxy- and 4-stearyloxy-2,2,6,6-tetramethylpiperidine, the condensate of N,N'-bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-cyclohexylamino-2,6-dichloro-1,3,5-triazine, the condensate of 1,2-bis(3-aminopropylamino)ethane and 2,4,6-trichloro-1,3,5-triazine and 4-butylamino-2,2,6,6-tetramethylpiperidine (CAS reg. No. [136504-96-6]); (2,2,6,6-tetramethyl-4-piperidyl)-n-dodecylsuccinimide, (1,2,2,6,6-pentamethyl-4-piperidyl)-n-dodecylsuccinimide, 2-undecyl-7,7,9,9-tetramethyl-1-oxa-3,8-diaza-4-oxo-spiro[4,5]decane, the reaction product of 7,7,9,9-tetramethyl-2-cycloundecyl-1-oxa-3,8-diaza-4-oxospiro[4,5]decane and epichlorohydrin, tetra(2,2,6,6-tetramethylpiperidin-4-yl)-butane-1,2,3,4-tetracarboxylate, tetra(1,2,2,6,6-pentamethylpiperidin-4-yl)-butane-1,2,3,4-tetracarboxylate, 2,2,4,4-tetramethyl-7-oxa-3,20-diaza-21-oxo-dispiro[5.1.11.2] - heneicosan, 8-acetyl-3-dodecyl-1,3,8-triaza-7,7,9,9-tetramethylspiro[4,5] -decane-2,4-dione,





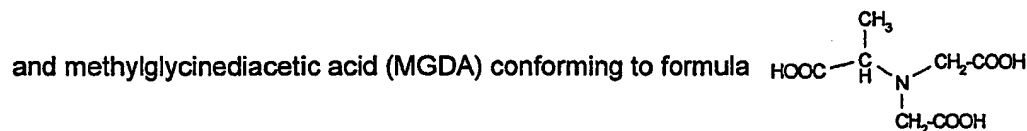
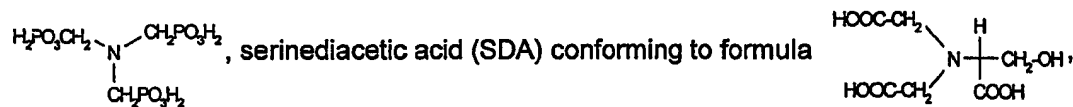
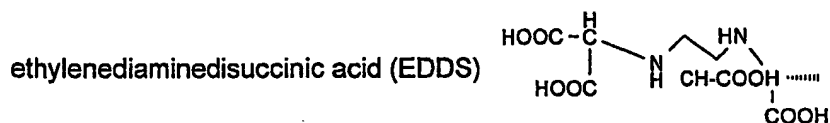
and



The complex formers of component (c) are for example nitrogen-containing complex formers or polyanionically-derived natural polysaccharides, for example those containing phosphate, phosphonate or methylphosphonate groups, such as chitin derivatives, e.g. sulfochitin,

carboxymethylchitin, phosphochitin or chitosan derivatives, for example sulfochitosan, carboxymethylchitosan or phosphochitosan.

The complex formers are for example selected from the group consisting of ethylenediamine-tetracetic acid (EDTA), nitrilotriacetic acid (NTA), α -alaninediacetic acid (EDTA) or



The present stabilizer systems are particularly suitable for stabilizing body care products, in particular for use in skin-care products, as bath and shower products, preparations containing fragrances and odoriferous substances, hair-care products, dentifrices, deodorizing and antiperspirant preparations, decorative preparations, light protection formulations and preparations containing active ingredients.

Suitable skin-care products are, in particular, body oils, body lotions, body gels, treatment creams, skin protection ointments, shaving preparations, such as shaving foams or gels, skin powders, such as baby powder, moisturising gels, moisturising sprays, revitalising body sprays, cellulite gels and peeling preparations.

Preparations containing fragrances and odoriferous substances are in particular scents, perfumes, toilet waters and shaving lotions (aftershave preparations).

Suitable hair-care products are, for example, shampoos for humans and animals, in particular dogs, hair conditioners, products for styling and treating hair, perming agents, hair sprays and lacquers, hair gels, hair fixatives and hair dyeing or bleaching agents.

Suitable dentifrices are in particular tooth creams, toothpastes, mouth-washes, mouth rinses, anti-plaque preparations and cleaning agents for dentures.

Suitable decorative preparations are in particular lipsticks, nail varnishes, eye shadows, mascaras, dry and moist make-up, rouge, powders, depilatory agents and suntan lotions.

Suitable cosmetic formulations containing active ingredients are in particular hormone preparations, vitamin preparations, vegetable extract preparations and antibacterial preparations.

The present body care products can be in the form of creams, ointments, pastes, foams, gels, lotions, powders, make-ups, sprays, sticks or aerosols. The present stabilizer systems may be present in the oil phase or in the aqueous or aqueous/alcoholic phase.

The additives of component (b) are present, for example, in the body care and household products in a concentration of about 5 to about 10000 ppm, based on the total formulation, for example from about 10 to about 5000 ppm, for example from about 100 to about 1000 ppm. For example the additives of component (b) are present in the body care and household products in a concentration of about 5, 10, 15, 20, 25, 35, 40, 45 or 50 ppm, based on the total formulation. For example, the additives of component (b) are present from about 5 to about 1000 ppm in the formulations (compositions) of this invention.

Laundry detergents, fabric softeners or other products, from which the additives of component (b) are intended for deposition onto fabrics with use, are considered household products of this invention, and the above concentration levels also pertain thereto. The present additives of component (b) are effective at stabilizing the laundry detergents and fabric softeners, as well as the fabrics treated therewith.

Creams are oil-in-water emulsions containing more than 50% water. The oil-containing base used therein is usually mainly fatty alcohols, for example lauryl, cetyl or stearyl alcohol, fatty acids, for example palmitic or stearic acid, liquid to solid waxes, for example isopropylmyristate or beeswax and/or hydrocarbon compounds, such as paraffin oil. Suitable emulsifiers are surfactants having primarily hydrophilic properties, such as the corresponding non-ionic emulsifiers, for example fatty acid esters of polyalcohols of ethylene oxide adducts, such as polyglycerol fatty acid ester or polyoxyethylenesorbitan fatty acid ether (Tween trademarks); polyoxyethylene fatty alcohol ether or their esters or the corresponding ionic emulsifiers, such as the alkali metal salts of fatty alcohol sulfonates, sodium cetyl sulfate or sodium stearyl sulfate, which are usually used together with fatty alcohols, such as cetyl alcohol or stearyl alcohol. In addition, creams contain agents which reduce water loss during evaporation, for example polyalcohols, such as glycerol, sorbitol, propylene glycol, and/or polyethylene glycols.

Ointments are water-in-oil emulsions which contain up to 70%, for instance not more than 20 to 50%, of water or of an aqueous phase. The oil-containing phase contains predominantly hydrocarbons, such as paraffin oil and/or solid paraffin which for instance contains hydroxy compounds, for example fatty alcohol or their esters, such as cetyl alcohol or wool wax for improving the water absorption. Emulsifiers are corresponding lipophilic substances, such as sorbitan fatty acid ester. In addition, the ointments contain moisturisers such as polyalcohols, for example glycerol, propylene glycol, sorbitol and/or polyethylene glycol as well as preservatives.

Rich creams are anhydrous formulations and are produced on the basis of hydrocarbon compounds, such as paraffin, natural or partially synthetic fats, for example coconut fatty acid triglycerides or, for instance, hardened oils and glycerol partial fatty acid esters.

Pastes are creams and ointments containing powdered ingredients which absorb secretions, for example metal oxides, such as titanium dioxide or zinc oxide, and also tallow and/or aluminium silicates which bind the moisture or the absorbed secretion.

Foams are liquid oil-in-water emulsions in aerosol form. Hydrocarbon compounds are used, inter alia, for the oil-containing phase, for example paraffin oil, fatty alcohols, such as cetyl alcohol, fatty acid esters, such as isopropylmyristate and/or waxes. Suitable emulsifiers are,

inter alia, mixtures of emulsifiers having predominantly hydrophilic properties, for example polyoxyethylenesorbitan fatty acid ester, and also emulsifiers having predominantly lipophilic properties, for example sorbitan fatty acid ester. Commercially available additives are usually additionally employed, for example preservatives.

Gels are, in particular, aqueous solutions or suspensions of active substances in which gel formers are dispersed or swelled, in particular cellulose ethers, such as methyl cellulose, hydroxyethyl cellulose, carboxymethyl cellulose or vegetable hydrocolloids, for example sodium alginate, tragacanth or gum Arabic and polyacrylate thickener systems. The gels for example additionally contain polyalcohols, such as propylene glycol or glycerol as moisturisers and wetting agents, such as polyoxyethylenesorbitan fatty acid ester. The gels furthermore contain commercially available preservatives, such as benzyl alcohol, phenethyl alcohol, phenoxyethanol and the like.

The following is a list of examples of body care products of this invention and their ingredients:

<u>Body care product</u>	<u>Ingredients</u>
moisturising cream	vegetable oil, emulsifier, thickener, perfume, water, antioxidant, uv absorbers
shampoo	surfactant, emulsifier, preservatives, perfume, antioxidant, uv absorbers
toothpaste	cleaning agent, thickener, sweetener, flavor, colorant, antioxidant, water, uv absorbers
lip-care stick	vegetable oil, wax, TiO ₂ , antioxidant, uv absorbers

The present body care products, household products, textiles and fabrics have high stability towards color changes and chemical degradation of the ingredients present in these products. For example, present compositions that comprise a dye are found to have excellent color stability.

Accordingly, the present invention further pertains to a stabilized composition comprising (a) a body care product, household product, textile or fabric,

- (b) an effective stabilizing amount of at least one compound selected from the group consisting of
- (i) hindered nitroxyl compounds of formula (I),
 - (ii) hindered hydroxylamine compounds of formula (II) and
 - (iii) hindered hydroxylamine salt compounds of formula (III) and
- (d) a dye.

Dyes according to the present invention are for example:

- inorganic pigments, for example iron oxide (Iron Oxide Red, Iron Oxide Yellow, Iron Oxide Black, etc.), Ultramarines, Chromium Oxide Green or Carbon Black;
- natural or synthetic organic pigments;
- disperse dyes which may be solubilized in solvents like direct hair dyes of the HC type, for example HC Red No. 3, HC Blue No. 2 and all other hair dyes listed in International Cosmetic Ingredient Dictionary and Handbook, 7th edition 1997) or the dispersion dyes listed in Color Index International or Society of Dyers and Colourists;
- color varnishes (insoluble salts of soluble dyes, like many Ca-, Ba- or Al-salts of anionic dyes);
- soluble anionic or cationic dyes, like acid dyes (anionic), basic dyes (cationic), direct dyes, reactive dyes or solvent dyes.

Generally, for the coloration of household- and body care products all substances are suitable which have an absorption in the visible light of electromagnetic radiation (wavelength of ca. 4000 to 700 nm). The absorption is often caused by the following chromophores: Azo- (mono-, di, tris-, or poly-)stilbene-, carotenoide-, diarylmethan-, triarylmethan-, xanthen-, acridin-, quinoline, methin- (also polymethin-), thiazol-, indamin-, indophenol-, azin-, oxazin, thiazin-, anthraquinone-, indigoid-, phtalocyanine- and further synthetic, natural and/or inorganic chromophores.

The present stabilizer systems are also used in household cleaning and treatment agents, for example in laundry products and fabric softeners, liquid cleansing and scouring agents, glass detergents, neutral cleaners (all-purpose cleaners), acid household cleaners (bath), bathroom cleaners, for instance in washing, rinsing and dishwashing agents, kitchen and oven cleaners, clear rinsing agents, dishwasher detergents, shoe polishes, polishing waxes, floor detergents and polishes, metal, glass and ceramic cleaners, textile-care products, rug clea-

ners and carpet shampoos, agents for removing rust, color and stains (stain remover salt), furniture and multipurpose polishes and leather and vinyl dressing agents (leather and vinyl sprays) and air fresheners.

The present invention also concerns home care and fabric care products such as drain cleaners, disinfectant solutions, upholstery cleaners, automotive care products (e.g., to clean and/or polish and protect paint, tires, chrome, vinyl, leather, fabric, rubber, plastic and fabric), degreasers, polishes (glass, wood, leather, plastic, marble, granite, and tile, etc.), and metal polishes and cleaners. Antioxidants are suitable to protect fragrances in above products as well as in dryer sheets. The present invention also relates to home care products such as candles, gel candles, air fresheners and fragrance oils (for the home).

The stabilizers of the present invention may be employed in fabric treatment that takes place after use of the fabric, referred to as fabric care. Such treatments include laundering, which uses detergents and/or fabric conditioner, and the application of non-detergent based fabric care products, such as spray-on products. When employed in this fashion, the present stabilizers are intended for deposition onto the fabric and used to protect the fabric, colorants and fragrances associated with said these fabrics from environmental damage.

Typical examples of household cleaning and treating agents are:

<u>Household cleaners/household treating agents</u>	<u>Ingredients</u>
detergent concentrate	surfactant mixture, ethanol, antioxidant, water, uv absorbers, antioxidant
shoe polish	wax, wax emulsifier, antioxidant, water, preservative, uv absorbers, antioxidant
wax-containing floor	emulsifier, wax, sodium chloride, antioxidant, water,
cleaning agent	preservative, uv absorbers, antioxidant

The present stabilizers are for example incorporated by dissolution in an oil phase or alcoholic or water phase, where required at elevated temperature.

The present invention also pertains to a method of stabilizing a body care product, household product, textile or fabric, which comprises incorporating therein or applying thereto at least one compound of the formulae (I), (II) and (III), for example at least one compound of the formulae A to EE and A* to EE*.

In the case of stabilized fabrics, for example dyed fabrics, the present stabilizers are applied thereto via deposition from for instance detergents, fabric conditioners or non-detergent based fabric care products.

The present fabrics are natural or synthetic, and may be woven or nonwoven.

The present invention also pertains to a method of stabilizing a body care product, household product, textile or fabric, each of which contain a dye, which comprises incorporating therein or applying thereto at least one compound of the formulae (I), (II) and (III), for example at least one compound of the formulae A to EE and A* to EE*. The stabilizers of formulae (I), (II) and (III) are very effective towards the stabilization of dyes in the present compositions.

The textiles of this invention are for example textile fiber materials, for example nitrogen-containing or hydroxy-group-containing fiber materials, for instance textile fiber materials selected from cellulose, silk, wool, synthetic polyamides, leather and polyurethanes. Included are cotton, linen and hemp, pulp and regenerated cellulose. Included also are cellulosic blends, for example mixtures of cotton and polyamide or cotton/polyester blends.

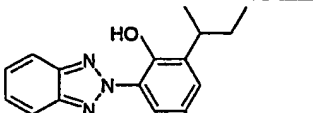
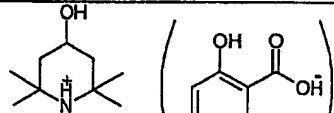
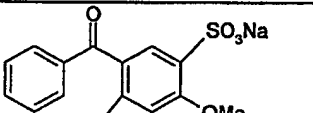
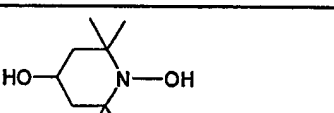
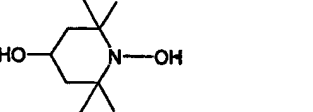
The additives of the present invention are for example applied to textiles in a dyeing or printing process, or in a finishing process. For instance, the additives may be applied as part of a dye formulation. The additives may be applied to textiles for example in an ink-jet printing process. The additives are for example applied as part of an aqueous dye solution or printing paste. They may be applied in an exhaust method or dyeing by the padder dyeing method, in which the textiles are impregnated with aqueous dye solutions, which may contain salts, and the dyes and additives are fixed, after an alkali treatment or in the presence of alkali, if appropriate with the action of heat or by storage at room temperature for several hours. After fixing, the dyeings or prints are rinsed thoroughly with cold and hot water, if

appropriate with the addition of an agent which has a dispersing action and promotes diffusion of the non-fixed portions.

The dye or ink formulations for application to textiles may comprise further customary additives, for example surfactants, antifoams, antimicrobials and the like, for example as disclosed in U.S. Pat. Nos. 6,281,339, 6,353,094 and 6,323,327, the disclosures of which are hereby incorporated by reference.

The following Examples illustrate the invention. Percentages are in weight percent unless indicated otherwise.

The following stabilizers are employed in the Examples:

(A)		(A)	
(B)		(D)	
(E)			

Aqueous based test formulations are prepared as follows:

sodium laureth sulfate (30%, TEXAPON NSO, Cognis)	30%
cocamidopropylbetaine (30%, DEHYTON K, Cognis)	10%
colorant	0.001%
stabilizer	0.05%
citric acid (10% aqueous solution)	to pH 6
deionized water	to 100%

About 20 ml of each of the aqueous test formulations are placed in a borosilicate glass bottle.

The glass bottles are exposed in an Atlas Ci-65 Xenon arc WeatherOmeter, AATCC Test Method 16, option E.

The bottles are also exposed to accelerated fluorescent lighting, Philips, 40 Watt, Daylight Deluxe (D65), full exposure to light.

Color measurements are performed on a Hunter Ultrascan XE spectrophotometer. Delta L, a and b values are the difference between the initial values and the values at each interval. Delta(Δ) E is calculated as follows:

$$[(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2]^{1/2} = \Delta E$$

Example 1: Aqueous model formulation with PURICOLOR BLUE ABL9

Aqueous formulations are prepared where the colorant is PURICOLOR BLUE ABL9 (FD&C Blue No. 1). Exposure is in a WeatherOmeter. Delta E is measured at 20-hour intervals.

Results are below:

stabilizer	delta E				
	20 hrs.	40 hrs.	60 hrs.	80 hrs.	100 hrs.
none (control)	47	---	---	---	---
(A)	46	---	---	---	---
(B)	47	---	---	---	---
(C)	4	5	27	49	---
(D)	1	6	37	47	---
(E)	1	4	7	11	17

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 2: Aqueous model formulation with PURICOLOR RED ARE33 (D&C Red No. 33)

Aqueous formulations are prepared where the colorant is PURICOLOR RED ARE33.

Exposure is in a WeatherOmeter. Delta E is measured at 20 hour intervals. Results are below:

stabilizer	delta E			
	20 hrs.	40 hrs.	60 hrs.	80 hrs.
none (control)	55	---	---	---
(A)	55	---	---	---
(B)	55	---	---	---
(C)	16	42	56	---
(D)	13	48	58	---
(E)	9	14	22	58

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 3: Aqueous model formulation with FD&C Red No. 40

Aqueous formulations are prepared where the colorant is FD&C Red No. 40. Exposure is in a WeatherOmeter. Delta E is measured at 20 hour intervals. Results are below:

stabilizer	delta E			
	20 hrs.	40 hrs.	60 hrs.	80 hrs.
none (control)	33	---	---	---
(A)	33	---	---	---
(B)	33	---	---	---
(C)	5	12	33	---
(D)	6	13	33	---
(E)	4	7	9	10

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 4: Aqueous model formulation with PURICOLOR BLUE ABL9

Aqueous formulations are prepared where the colorant is PURICOLOR BLUE ABL9. Exposure is to fluorescent light. Delta E is measured at weekly intervals. Results are below:

delta E

<u>stabilizer</u>	<u>1 week</u>	<u>2 weeks</u>	<u>4 weeks</u>	<u>5 weeks</u>	<u>6 weeks</u>	<u>8 weeks</u>	<u>14weeks</u>
none (control)	46	---	---	---	---	---	---
(A)	46	---	---	---	---	---	---
(B)	28	47					
(C)	2.4	3.4	4	5	8	39	---
(D)	1	1	2	3.4	47	---	---
(E)	0.7	1	2	3	5	9	17

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 5: Aqueous model formulation with D&C Red No. 33

Aqueous formulations are prepared where the colorant is PURICOLOR RED ARE33 (D&C Red No. 33). Exposure is to fluorescent light. Delta E is measured at weekly intervals.

Results are below:

delta E

<u>stabilizer</u>	<u>1 week</u>	<u>2 weeks</u>	<u>4 weeks</u>	<u>5 weeks</u>	<u>7 weeks</u>	<u>8 weeks</u>
none (control)	29	55	---	---	---	---
(A)	18	56	---	---	---	---
(B)	20	55				
(C)	15	23	45	55	8	39
(D)	7	12	19	55	47	---
(E)	5	9	15	19	22	24

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 6: Aqueous model formulation with FD&C Red No. 40

Aqueous formulations are prepared where the colorant is FD&C Red No. 40. Exposure is to fluorescent light. Delta E is measured at weekly intervals. Results are below:

<u>stabilizer</u>	<u>1 week</u>	<u>2 weeks</u>	<u>4 weeks</u>	<u>5 weeks</u>	<u>7 weeks</u>	<u>8 weeks</u>
none (control)	33	----	----	----	----	----
(A)	33	----	----	----	----	----
(B)	33	----	----	----	----	----
(C)	3	5	8	11	23	33
(D)	3	5	9	11	18	33
(E)	2	3	5	7	10	12

It is seen that the stabilizers of the present invention, (C), (D) and (E), provide far greater color stability than state of the art stabilizers (A) and (B).

Example 7: Preparation of a moisturiser cream

<u>Phase</u>	<u>Ingredients</u>	<u>(w/w) %</u>
A	passionflower oil	8
	glyceryl dioleate	4
	dicapryl ether	4
	isopropylisostearate	4
	stabilizer (C), (D) or (E)	0.05
B	water, demin.	ad. 100
	EDTA	0.1
C	carbomer	0.15
D	sodium hydroxide	10%
		0.20
E	perfume; preservative	q.s.

The components of phase A are thoroughly mixed in a homogenizer for 10 min at 75-80°C. The water phase B, likewise heated to 75-80°C beforehand, is slowly added and the mixture is homogenized for 1 min. The mixture is cooled, with stirring, to 40°C and then phases C and E are added and the mixture is homogenized for 1 min. Subsequently, phase D is added and the mixture is homogenized for 1/2 min and cooled, with stirring, to room temperature. Excellent results are achieved.

Example 8: Preparation of a toilet water (w/w) %

<u>Ingredients</u>	<u>(w/w) %</u>
ethanol, 96%	60
d-limonene	5
cedrene	1.5
citronellol	0.5
savin	0.5
stabilizer (C), (D) or (E)	0.08
UV absorber	0.1
S,S-EDDS	0.005
colorant (D&C Yellow No.5)	0.02
water	ad. 100

The components are thoroughly mixed in the cited sequence at 50°C, a clear homogeneous solution being obtained. The UV absorber is one of the present disclosure, for example 3-(2H-benzotriazol-2-yl)-4-hydroxy-5-(1-methylpropyl)-benzenesulfonic acid monosodium salt. Excellent results are achieved.

Example 9: Preparation of a hair styling spray

<u>Ingredients</u>	<u>(w/w) %</u>
alcohol, anhydrous	96.21
octylacrylamide/acrylate/butylaminoethylmethacrylate copolymer	2.52
hydroxypropyl cellulose	0.51
aminomethylpropanol (95%)	0.46
stabilizer (C), (D) or (E)	0.05
UV absorber	0.05
perfume oil	0.20

The hydroxypropyl cellulose is first predissolved in half of the alcohol (Vortex mixer) and is charged with the aminomethylpropanol. The other components - with the exception of the acrylate resin - are dissolved in alcohol and this solution is added, with stirring, to the hydroxypropyl cellulose. Subsequently, the acrylate resin is added and stirred until completely dissolved. Benzophenone-4 is 5-benzoyl-4-hydroxy-2-methoxybenzenesulfonic acid, sodium salt. Excellent results are achieved.

Example 10: Preparation of a shampoo for greasy hair

<u>Ingredients</u>	<u>(w/w) %</u>
sodium myreth sulfate	50.00
TEA abietoyl collagen hydrolysate	3.50
laureth-3	3.00
colorant (D&C Red No. 33)	0.20
stabilizer (C), (D) or (E)	0.05
UV absorber	0.15
phosphonomethylchitosan, sodium salt	0.01
perfume oil	0.10
water	ad. 100

The components are mixed, with stirring, at room temperature until they are completely dissolved. The pH is 6.5. The UV absorber is one of the present disclosure, for example 2-(2-hydroxy-3-dodecyl-5-methylphenyl)-2H-benzotriazole. Excellent results are achieved.

Example 11: Preparation of a leather dressing and cleaning agent

<u>Ingredients</u>	<u>(w/w) %</u>
synthetic soap (Zetesap 813)	7.85
glycerol	6.00
anionic surfactant (Lumorol 4192; Mulsifan RT 13)	22.00
Vaseline	11.00
paraffin 52/54	20.00
talcum	2.00
orange terpene	4.00
stabilizer (C), (D) or (E)	0.02
water	27.13

The stabilizer is predissolved in the terpene. The components are then stirred in the cited sequence at about 65°C until homogeneous. The mixture is then cooled to room temperature. Excellent results are achieved.

Example 12: Preparation of a glass detergent**Ingredients****(w/w) %**

anionic / amphoteric surfactants (Lumorol RK)	0.7
butyl glycol	5.0
Isopropanol	20.0
d-limonene	4.00
stabilizer (C), (D) or (E)	0.02
water, demin.	ad. 100

The stabilizer is predissolved in the terpene. The components are then dissolved in the cited sequence until a clear homogeneous mixture is obtained. Excellent results are achieved.

Example 13: Protection of Dyes in Fabrics

Stabilizers (C), (D) and (E) are each deposited (from water) on a dyed cotton fabric at 0.05, 0.1, 0.2, 0.5 and 1.0 percent by weight, based on the weight of the cotton. The dyed fabrics contain the following dyes at 0.05, 0.1, 0.2 and 0.5 percent by weight based on cotton. This results in 60 separate formulations for each dye listed:

Scarlet HE-3G	Crimson HE-XL	Yellow HE-6G	Red HE-XL
Blue HE-XL	Turquoise H-A	Navy HE-XL	Remazol
Red RB	Brilliant Red RBS	Orange FR	Navy CG
Turquoise G	Black B		

The cotton fabrics are subjected to light exposure in an Atlas Ci-65 Xenon arc WetherOmeter and to accelerated fluorescent lighting. The present stabilizers provide outstanding color protection to the dyed fabrics. This experiment simulates dye protection achievable through deposition of the present stabilizers via treatment with for example stabilizer-containing laundry detergent or fabric conditioner.

Similar dye protection is also afforded to textiles such as wool, silk, leather, cellulose and polyamides.

What is Claimed is:

1. A stabilized composition comprising

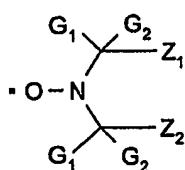
(a) a body care product, household product, textile or fabric and

(b) an effective stabilizing amount of at least one compound selected from the group consisting of

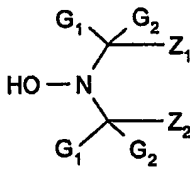
(i) hindered nitroxyl compounds of formula (I),

(ii) hindered hydroxylamine compounds of formula (II) and

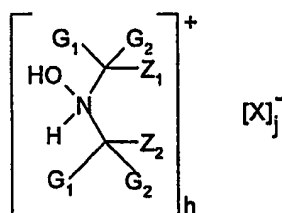
(iii) hindered hydroxylamine salt compounds of formula (III)



(I)



(II)



(III)

where

G_1 and G_2 are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene, Z_1 and Z_2 are each methyl, or Z_1 and Z_2 together form a linking moiety which may additionally be substituted by an ester, ether, hydroxy, oxo, cyanohydrin, amide, amino, carboxy or urethane group,

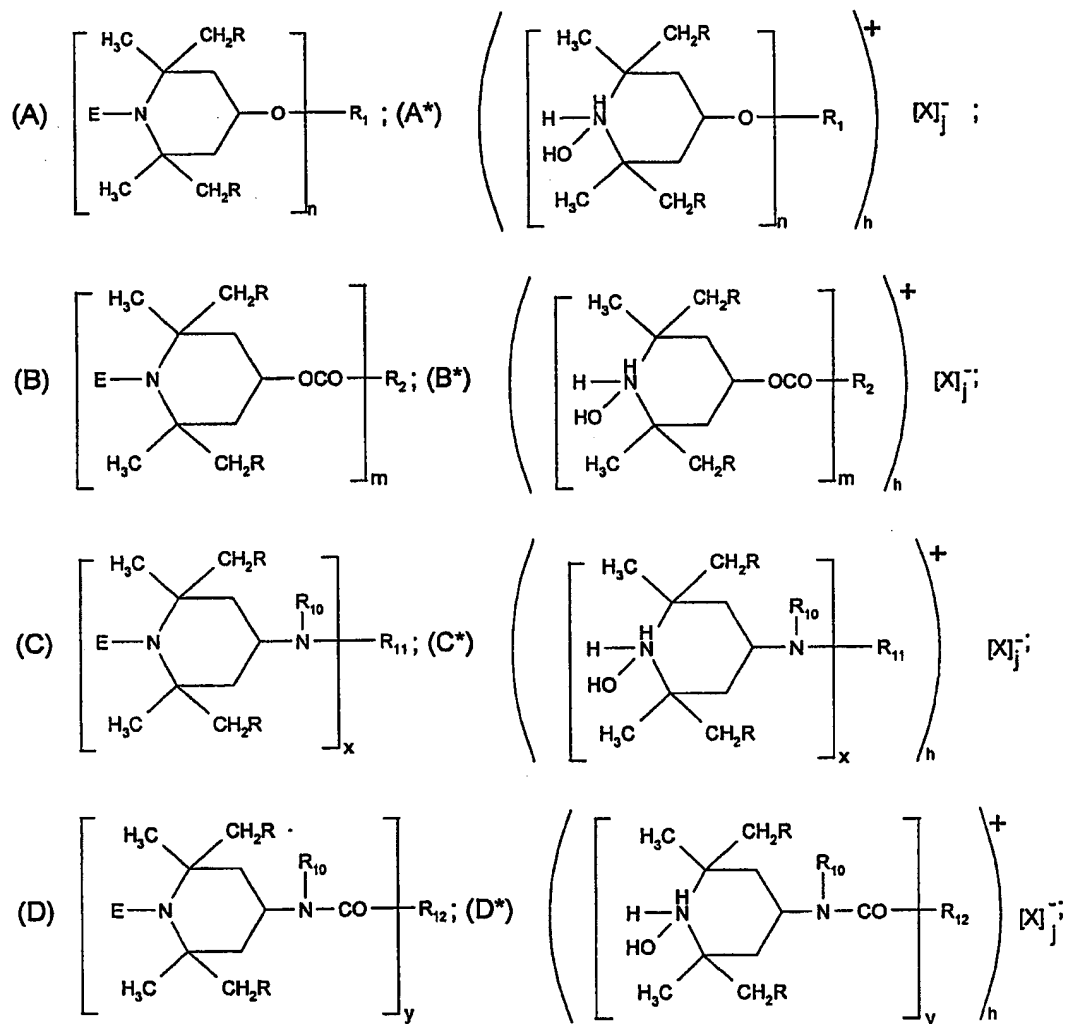
X is an inorganic or organic anion, such as phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepentamethylenephosphonate, an alkylsulfonate or an arylsulfonate, and

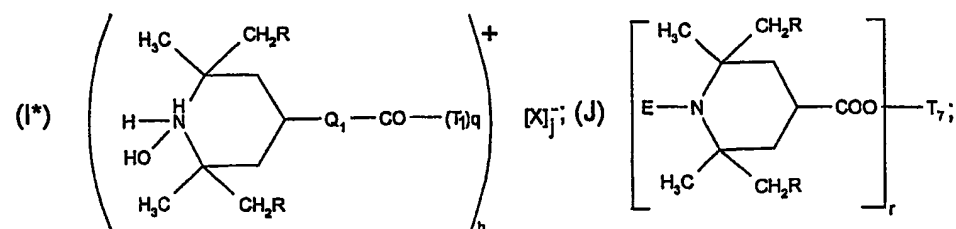
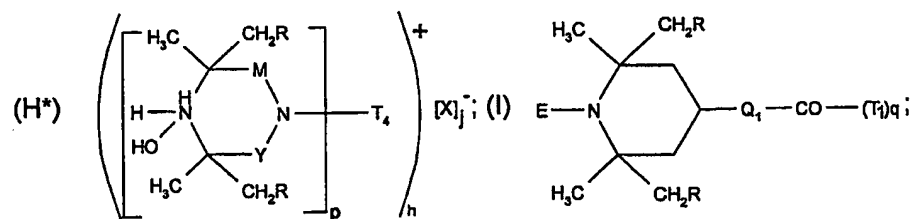
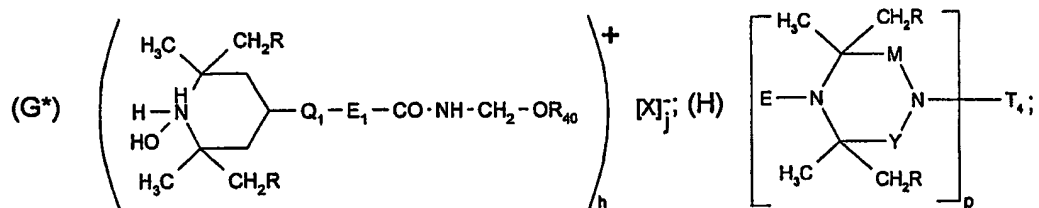
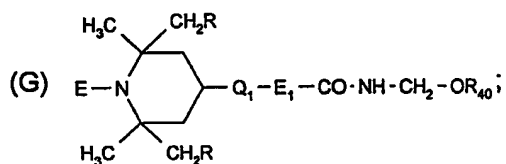
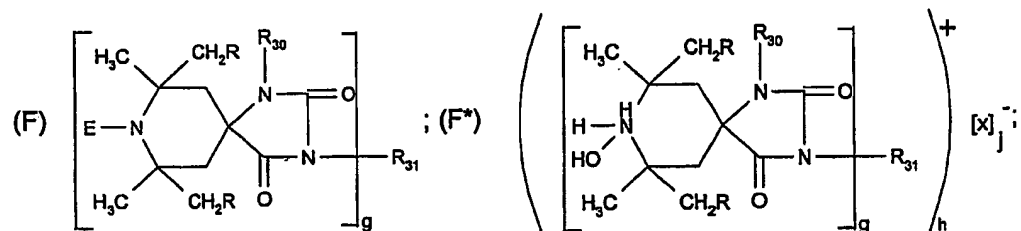
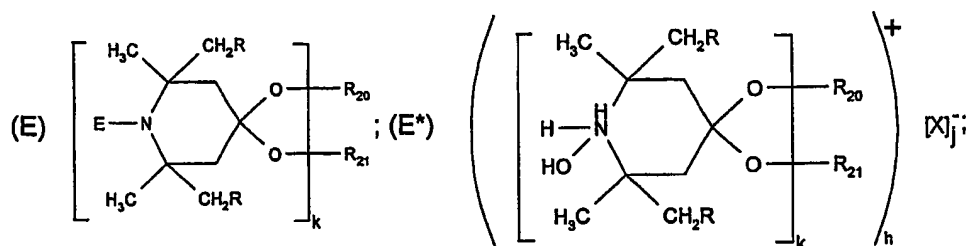
where the total charge of cations h is equal to the total charge of anions j .

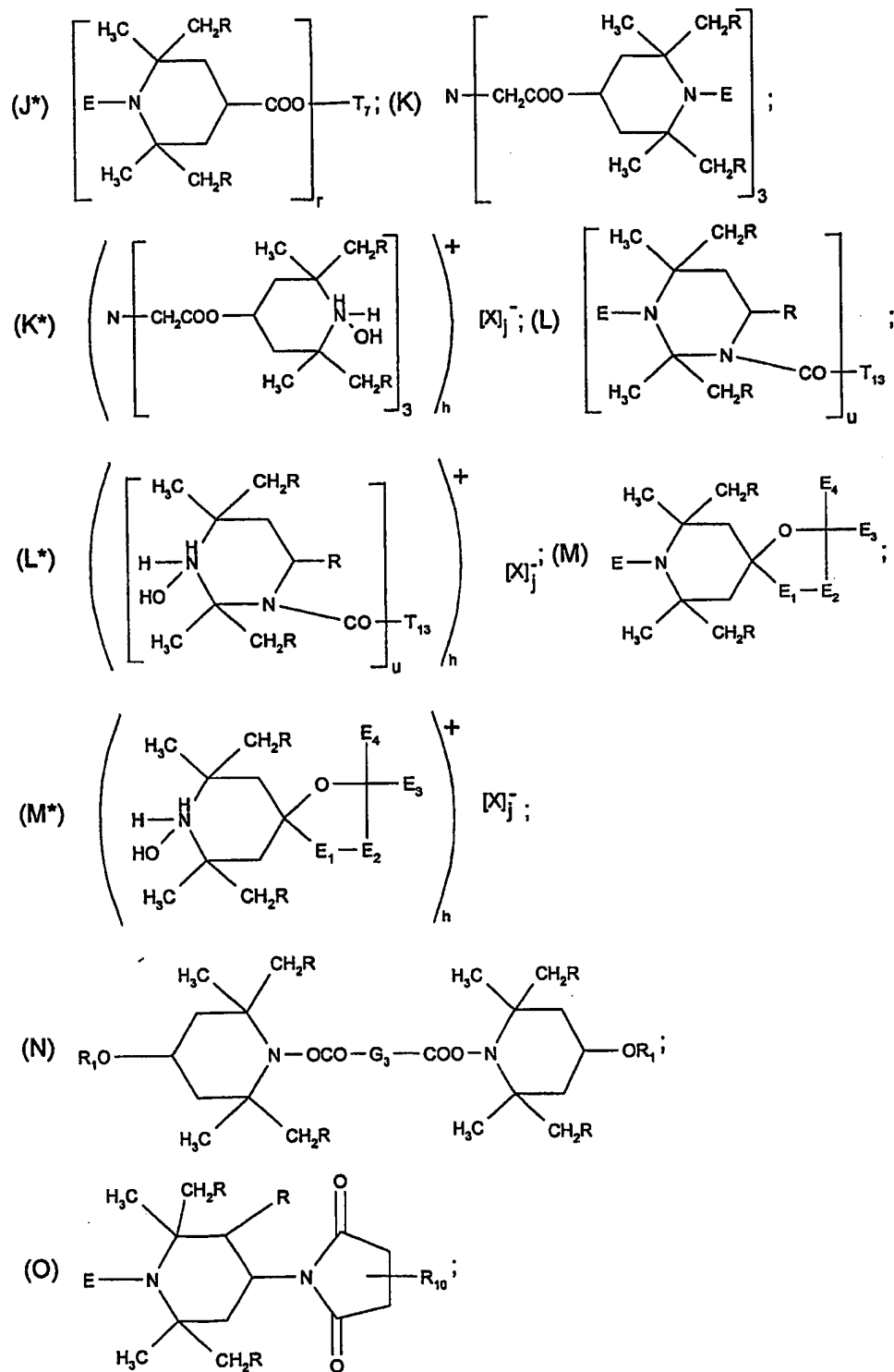
2. A composition according to claim 1 where X is phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a

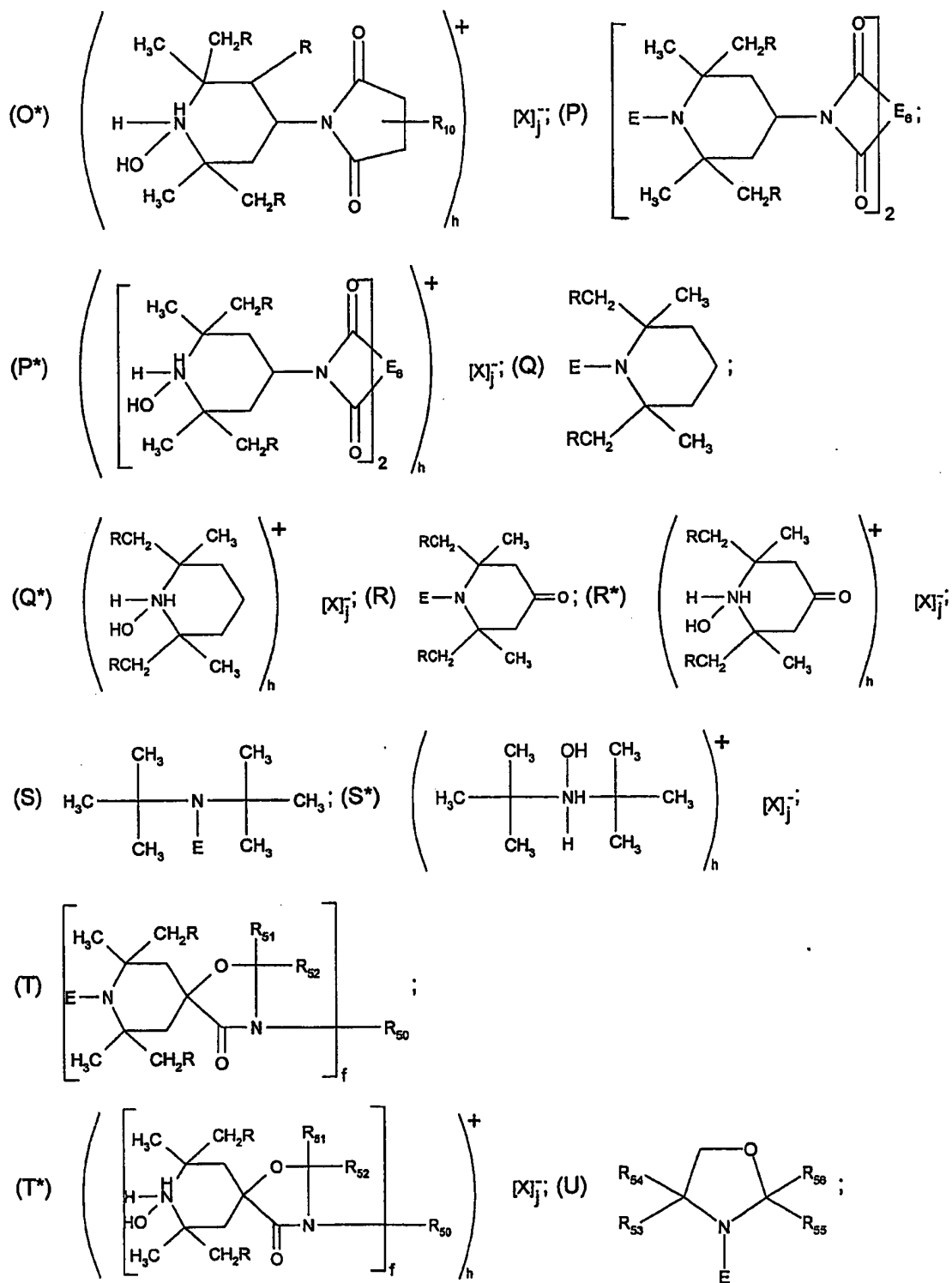
carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepenta-methylenephosphonate, an alkylsulfonate or an arylsulfonate.

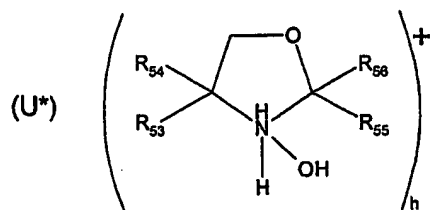
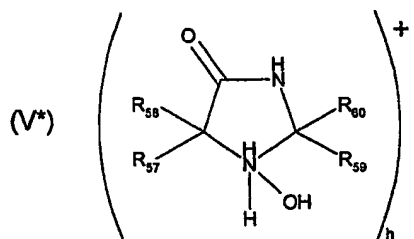
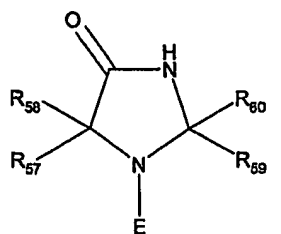
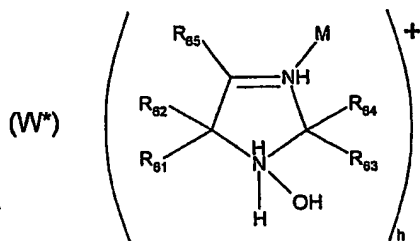
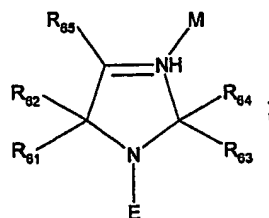
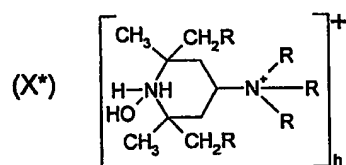
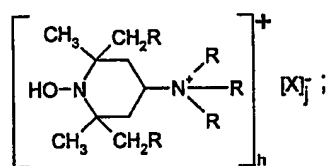
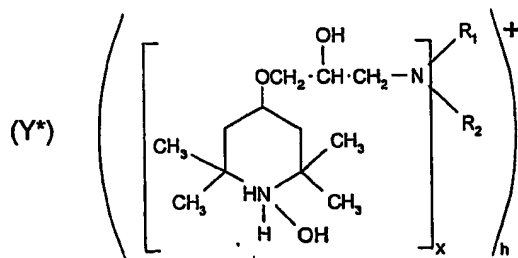
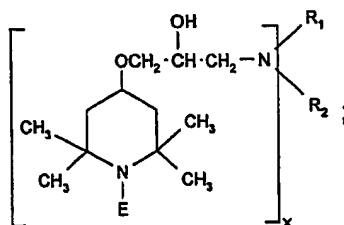
3. A composition according to claim 1 in which the compounds of component (b) are of formulae A to EE and A* to EE*

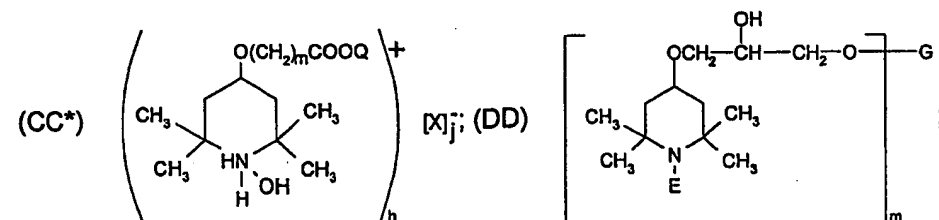
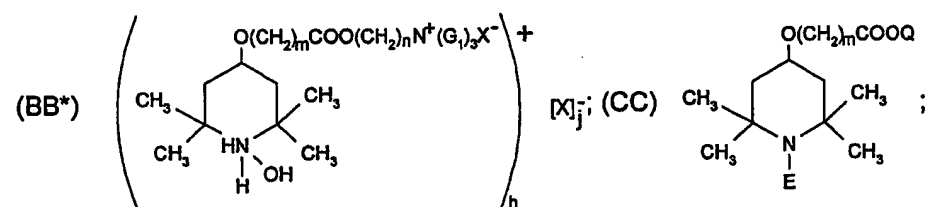
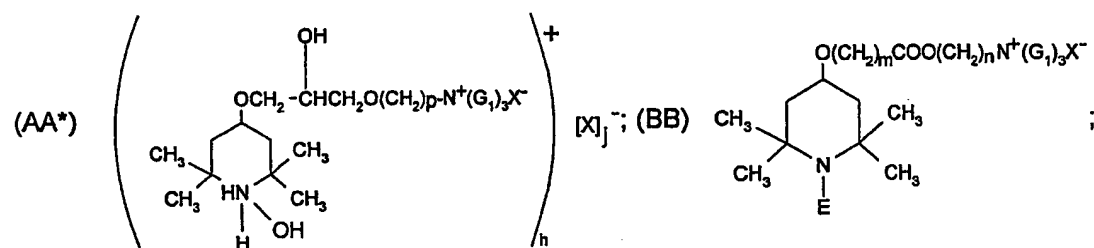
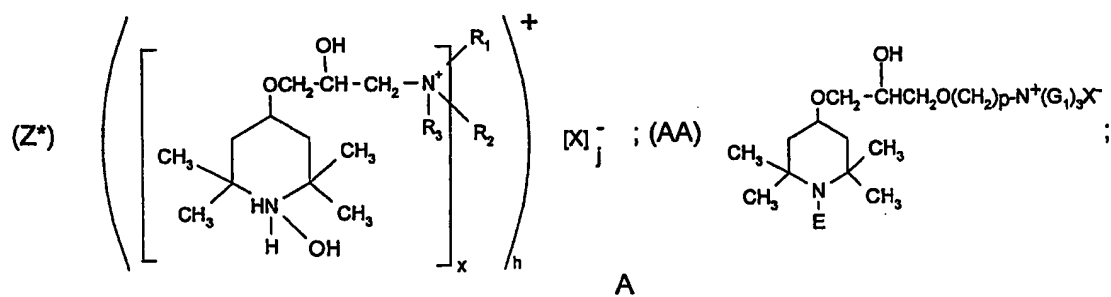
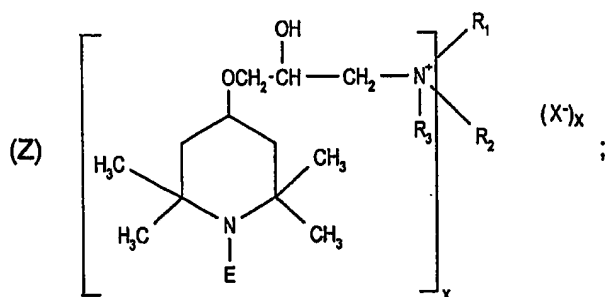


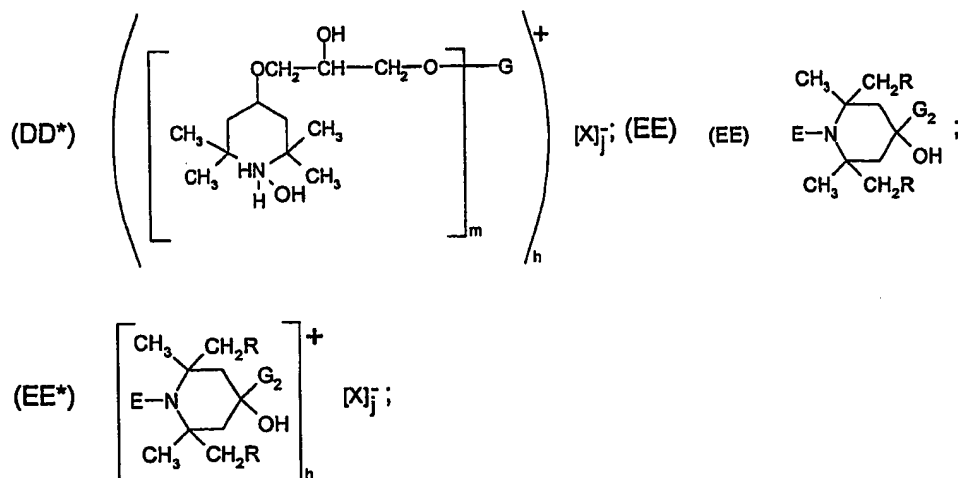






[X]_j⁻; (V)[X]_j⁻; (W)[X]_j⁻; (X)[X]_j⁻; (Y)[X]_j⁻;





wherein

E is oxyl or hydroxyl,

R is hydrogen or methyl,

in formula A and A*,

n is 1 or 2,

when n is 1,

R₁ is hydrogen, alkyl of 1 to 18 carbon atoms, alkenyl of 2-18 carbon atoms, propargyl, glycidyl, alkyl of 2 to 50 carbon atoms interrupted by one to twenty oxygen atoms, said alkyl substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R₁ is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by -COOZ where Z is hydrogen, alkyl of 1 to 4 carbon atoms or phenyl, or where Z is said alkyl substituted by - (COO)ⁿ Mⁿ⁺ where n is 1-3 and M is a metal ion from the 1st, 2nd or 3rd group of the periodic table or is Zn, Cu, Ni or Co, or M is a group N^{m+}(R₂)₄ where R₂ is alkyl of 1 to 8 carbon atoms or benzyl,

when n is 2,

R₁ is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylylene or alkylene of 1 to 50 carbon atoms interrupted by one to twenty oxygen atoms, substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups,

in formula B and B*,

m is 1 to 4,

when m is 1,

R_2 is alkyl of 1 to 18 carbon atoms, alkyl of 3 to 18 carbon atoms interrupted by $-\text{COO}-$, or R_2 is $-\text{CH}_2(\text{OCH}_2\text{CH}_2)_n\text{OCH}_3$ where n is 1 to 12, or

R_2 is cycloalkyl of 5 to 12 carbon atoms, aryl of 6 to 12 carbon atoms, or said aryl substituted by one to four alkyl groups of 1 to 4 carbon atoms, or

R_2 is $-\text{NHR}_3$ where R_3 is alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aryl of 6 to 12 carbon atoms, or said aryl substituted by one to four alkyl of 1 to 4 carbon atoms, or

R_2 is $-\text{N}(\text{R}_3)_2$ where R_3 is as defined above, when m is 2,

R_2 is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylylene, alkylene of 2 to 12 carbon atoms interrupted by $-\text{COO}-$, or R_2 is $-\text{CH}_2(\text{OCH}_2\text{CH}_2)_n\text{OCH}_2-$ where n is 1 to 12, or

R_2 is cycloalkylene of 5 to 12 carbon atoms, aralkylene of 7 to 15 carbon atoms or arylene of 6 to 12 carbon atoms, or

R_2 is $-\text{NHR}_4\text{NH}-$ where R_4 is alkylene of 2 to 18 carbon atoms, cycloalkylene of 5 to 12 carbon atoms, aralkylene of 8 to 15 carbon atoms or arylene of 6 to 12 carbon atoms, or

R_2 is $-\text{N}(\text{R}_3)\text{R}_4\text{N}(\text{R}_3)-$ where R_3 and R_4 are as defined above, or

R_2 is $-\text{CO}-$ or $-\text{NH-CO-NH}-$,

when m is 3,

R_2 is alkanetriyl of 3 to 8 carbon atoms or benzenetriyl, or

when m is 4,

R_2 is alkanetetrayl of 5 to 8 carbon atoms or benzenetetrayl, in formula C and C*,

R_{10} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, alkanoyl of 2 to 18 carbon atoms, alkenoyl of 3 to 5 carbon atoms or benzoyl,

x is 1 or 2,

when x is 1,

R_{11} is hydrogen, alkyl of 1 to 18 carbon atoms, alkenyl of 2 to 18 carbon atoms, propargyl, glycidyl, alkyl of 2 to 50 carbon atoms interrupted by one to twenty oxygen atoms, said alkyl substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R_{11} is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $-\text{COOZ}$ where Z is hydrogen, alkyl of 1 to 4 carbon atoms or phenyl, or where Z is said alkyl substituted by -

$(\text{COO}^-)_n \text{M}^{n+}$ where n is 1-3 and M is a metal ion from the 1st, 2nd or 3rd group of the periodic table or is Zn, Cu, Ni or Co, or M is a group $\text{N}^{n+}(\text{R}_2)_4$ where R_2 is hydrogen, alkyl of 1 to 8 carbon atoms or benzyl, or

when x is 2,

R_{11} is alkylene of 1 to 12 carbon atoms, alkenylene of 4 to 12 carbon atoms, xylene or alkylene of 1 to 50 carbon atoms interrupted by one to twenty oxygen atoms, substituted by one to ten hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups,

in formula D and D*,

R_{10} is as defined above,

y is 1 to 4, and

R_{12} is defined as R_2 above

in formula E and E*,

k is 1 or 2,

when k is 1,

R_{20} and R_{21} are independently alkyl of 1 to 12 carbon atoms, alkenyl of 2 to 12 carbon atoms or aralkyl of 7 to 15 carbon atoms, or R_{20} is also hydrogen, or

R_{20} and R_{21} together are alkylene of 2 to 8 carbon atoms or said alkylene substituted by hydroxyl, or are acyloxy-alkylene of 4 to 22 carbon atoms, or

when k is 2,

R_{20} and R_{21} are together $(-\text{CH}_2)_2\text{C}(\text{CH}_2)_2$,

in formula F and F*,

R_{30} is hydrogen, alkyl of 1 to 18 carbon atoms, benzyl, glycidyl, or alkoxyalkyl of 2 to 6 carbon atoms,

g is 1 or 2,

when g is 1, R_{31} is defined as R_1 above when n is 1,

when g is 2, R_{31} is defined as R_1 above when n is 2,

in formula G and G*,

Q_1 is $-\text{NR}_{41}-$ or $-\text{O}-$,

E_1 is alkylene of 1 to 3 carbon atoms, or E_1 is $-\text{CH}_2-\text{CH}(\text{R}_{42})-\text{O}-$ where R_{42} is hydrogen, methyl or phenyl, or E_1 is $-(\text{CH}_2)_3-\text{NH}-$ or E_1 is a direct bond,

R_{40} is hydrogen or alkyl of 1 to 18 carbon atoms,

R_{41} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms, or R_{41} is $-\text{CH}_2-\text{CH}(\text{R}_{42})-\text{OH}$ where R_{42} is as defined above,

in formula H and H^* ,

p is 1 or 2,

T_4 is as defined for R_{11} when x is 1 or 2,

M and Y are independently methylene or carbonyl, for instance M is methylene and Y is carbonyl,

in formula I and I^* ,

this formula denotes a recurring structural unit of a polymer where T_1 is ethylene or 1,2-propylene or is the repeating structural unit derived from an alpha-olefin copolymer with an alkyl acrylate or methacrylate, and where

q is 2 to 100,

Q_1 is $-\text{N}(\text{R}_{41})-$ or $-\text{O}-$ where R_{41} is as defined above,

in formula J and J^* ,

r is 1 or 2,

T_7 is as defined for R_1 when n is 1 or 2 in formula A,

for example T_7 is octamethylene when r is 2,

in formula L and L^* ,

u is 1 or 2,

T_{13} is as defined for R_1 when n is 1 or 2 in formula A, with the proviso that T_{13} is not hydrogen when u is 1,

in formula M and M^* ,

E_1 and E_2 , being different, each are $-\text{CO}-$ or $-\text{N}(\text{E}_5)-$ where E_5 is hydrogen, alkyl of 1 to 12 carbon atoms or alkoxy carbonylalkyl of 4 to 22 carbon atoms, for instance E_1 is $-\text{CO}-$ and E_2 is $-\text{N}(\text{E}_5)-$,

E_3 is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl, said phenyl or said naphthyl substituted by chlorine or by alkyl of 1 to 4 carbon atoms, or phenylalkyl of 7 to 12 carbon atoms, or said phenylalkyl substituted by alkyl of 1 to 4 carbon atoms,

E_4 is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl or phenylalkyl of 7 to 12 carbon atoms, or

E_3 and E_4 together are polymethylene of 4 to 17 carbon atoms, or said polymethylene substituted by one to four alkyl of 1 to 4 carbon atoms, for example methyl,

in formula N,

R_1 is as defined for R_1 in formula A when n is 1,
 G_3 is a direct bond, alkylene of 1 to 12 carbon atoms, phenylene or $-NH-G_1-NH-$ where G_1 is alkylene of 1 to 12 carbon atoms,
 in formula O and O*,
 R_{10} is as defined for R_{10} in formula C,
 in formula P and P*,
 E_6 is an aliphatic or aromatic tetravalent radical, for example neopentetetrayl or benzenetetrayl,
 in formula T and T*,
 R_{51} is hydrogen, alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, or aryl of 6 to 10 carbon atoms,
 R_{52} is hydrogen or alkyl of 1 to 18 carbon atoms, or
 R_{51} and R_{52} together of alkylene of 4 to 8 carbon atoms,
 f is 1 or 2,
 when f is 1,
 R_{50} is as defined for R_{11} in formula C when x is 1, or R_{50} is $-(CH_2)_zCOOR_{54}$ where z is 1 to 4 and R_{54} is hydrogen or alkyl of 1 to 18 carbon atoms, or R_{54} is a metal ion from the 1st, 2nd or 3rd group of the periodic table or a group $-N(R_{55})_4$ where R_{55} is hydrogen, alkyl of 1 to 12 carbon atoms or benzyl,
 when f is 2, R_{50} is as defined for R_{11} in formula C when x is 2,
 in formula U and U*,
 R_{53} , R_{54} , R_{55} and R_{56} are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene.
 in formula V and V*,
 R_{57} , R_{58} , R_{59} and R_{60} are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene.
 in formula W and W*,
 R_{61} , R_{62} , R_{63} and R_{64} are independently alkyl of 1 to 4 carbon atoms or are together pentamethylene,
 R_{65} is alkyl of 1 to 5 carbon atoms,
 M is hydrogen or oxygen,
 wherein in formulas X to CC and X* to CC*
 n is 2 to 3,
 G_1 is hydrogen, methyl, ethyl, butyl or benzyl,

m is 1 to 4,

x is 1 to 4,

when x is 1,

R₁ and R₂ are independently alkyl of 1 to 18 carbon atoms, said alkyl interrupted by one to five oxygen atoms, said alkyl substituted by 1 to 5 hydroxyl groups or said alkyl both interrupted by said oxygen atoms and substituted by said hydroxyl groups; cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms or said aryl substituted by one to three alkyl of 1 to 8 carbon atoms, or R₁ is also hydrogen, or R₁ and R₂ are together tetramethylene, pentamethylene, hexamethylene or 3-oxapentamethylene,

when x is 2,

R₁ is hydrogen, alkyl of 1 to 8 carbon atoms, said alkyl interrupted by one or two oxygen atoms, said alkyl substituted by a hydroxyl group, or said alkyl both interrupted by one or two oxygen atoms and substituted by a hydroxyl group,

R₂ is alkylene of 2 to 18 carbon atoms, said alkylene interrupted by one to five oxygen atoms, said alkylene substituted by 1 to 5 hydroxyl groups or said alkylene both interrupted by said oxygen atoms and substituted by said hydroxyl groups; o-, m- or p-phenylene or said phenylene substituted by one or two alkyl of 1 to 4 carbon atoms, or

R₂ is $-(CH_2)_kO[(CH_2)_kO]_h(CH_2)_k-$ where k is 2 to 4 and h is 1 to 40, or

R₁ and R₂ together with the two N atoms to which they are attached are piperazin-1,4-diyl,

when x is 3,

R₁ is hydrogen

R₂ is alkylene of 4 to 8 carbon atoms interrupted by one nitrogen atom,

when x is 4,

R₁ is hydrogen,

R₂ is alkylene of 6 to 12 carbon atoms interrupted by two nitrogen atoms,

R₃ is hydrogen, alkyl of 1 to 8 carbon atoms, said alkyl interrupted by one or two oxygen atoms, said alkyl substituted by a hydroxyl group, or both interrupted by one or two oxygen atoms and substituted by a hydroxyl group,

P is 2 or 3, and

Q is an alkali metal salt, ammonium or N⁺(G₁)₄

in formula DD and DD*

m is 2 or 3,

when m is 2,

G is $-(CH_2CHR-O)_rCH_2CHR-$, where r is 0 to 3, and R is hydrogen or methyl, and when m is 3,

G is glyceryl,

in formula EE and EE*

G₂ is -CN, -CONH₂ or -COOG₃ where G₃ is hydrogen, alkyl of 1 to 18 carbon atoms or phenyl,

X is an inorganic or organic anion, such as phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepentamethylenephosphonate, an alkylsulfonate or an arylsulfonate, and where the total charge of cations h is equal to the total charge of anions j.

4. A composition according to claim 3 where X is phosphate, phosphonate, carbonate, bicarbonate, nitrate, chloride, bromide, bisulfite, sulfite, bisulfate, sulfate, borate, formate, acetate, benzoate, citrate, oxalate, tartrate, acrylate, polyacrylate, fumarate, maleate, itaconate, glycolate, gluconate, malate, mandelate, tiglate, ascorbate, polymethacrylate, a carboxylate of nitrilotriacetic acid, hydroxyethylethylenediaminetriacetic acid, ethylenediaminetetraacetic acid or of diethylenetriaminepentaacetic acid, a diethylenetriaminepentamethylenephosphonate, an alkylsulfonate or an arylsulfonate.

5. A composition according to claim 3 where the compounds of component (b) are of formulae A, A*, B, B*, C, C*, D, D*, Q, Q*, R, R*, S, S*, X, X*, Y, Y*, Z and Z*, where

R is hydrogen,

in formula A and A*

n is 1 or 2,

when n is 1,

R₁ is hydrogen, alkyl of 1 to 6 carbon atoms, alkenyl of 2 to 6 carbon atoms, propargyl, glycidyl, alkyl of 2 to 20 carbon atoms interrupted by one to ten oxygen atoms, said alkyl substituted by one to five hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R_1 is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $-COOZ$ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when n is 2,

R_1 is alkylene of 1 to 8 carbon atoms, alkenylene of 4 to 8 carbon atoms, alkylene of 1 to 20 carbon atoms interrupted by one to ten oxygen atoms, substituted by one to five hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups

in formula B and B*

m is 1 or 2

when m is 1,

R_2 is alkyl of 1 to 4 carbon atoms or R_2 is $CH_2(OCH_2CH_2)_nOCH_3$ where n is 1 to 12, or

R_2 is phenyl, or said phenyl substituted by one to three methyl groups,

R_2 is $-NHR_3$ where R_3 is alkyl of 1 to 4 carbon atoms or phenyl, or said phenyl substituted by one or two methyl groups,

when m is 2,

R_2 is alkylene of 1 to 8 carbon atoms, alkenylene of 4 to 8 carbon atoms, or R_2 is $-CH_2(OCH_2CH_2)_nOCH_2-$ where n is 1 to 12,

R_2 is NHR_4NH where R_4 is of 2 to 6 carbon atoms, aralkylene of 8 to 15 carbon atoms or arylene of 6 to 12 carbon atoms,

R_2 is $-CO-$ or $-NHCONH$

in formula C and C*,

R_{10} is hydrogen or, alkanoyl of 1 to 3 carbon atoms,

x is 1 or 2,

when x is 1,

R_{11} is hydrogen, alkyl of 1 to 6 carbon atoms or glycidyl,

R_{11} is alkyl of 1 to 4 carbon atoms substituted by a carboxy group or by $COOZ$ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when x is 2,

R_{11} is alkylene of 1 to 6 carbon atoms,

in formula D and D*,

R_{10} is hydrogen,

y is 1 or 2,

R_{12} is defined as R_2 above,

in formula Y, Y*, Z and Z*,

x is 1 or 2,

when x is 1,

R₁ and R₂ are independently alkyl of 1 to 4 carbon atoms,

or R₁ and R₂ are together tetramethylene, or pentamethylene,

R₂ is hydrogen or alkyl of 1 to 4 carbon atoms, said alkyl group substituted by a hydroxyl group,

when x is 2,

R₁ is hydrogen, alkyl of 1 to 4 carbon atoms, said alkyl substituted by a hydroxyl group,

R₂ is alkylene of 2 to 6 carbon atoms,

R₃ is as defined above.

6. A composition according to 5 where the compounds of component (b) are of formulae A, A*, B, B*, C, C*, D, D*, Q, Q*, R and R*,

where

R is hydrogen,

in formula A and A*,

h is 1,

R₁ is hydrogen, alkyl of 1 to 4 carbon atoms, glycidyl, alkyl of 2 to 4 carbon atoms interrupted by one or two oxygen atoms, said alkyl substituted by one or two hydroxyl groups or both interrupted by said oxygen atoms and substituted by said hydroxyl groups, or

R₁ is alkyl of 1 to 4 carbon atoms substituted by -COOZ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

in formula B and B*,

m is 1 or 2,

R₂ is alkyl of 1 to 4 carbon atoms or R₂ is CH₂(OCH₂CH₂)_nOCH₃ where n is 1 to 4,

when m is 2,

R₂ is alkylene of 1 to 8 carbon atoms

in formula C and C*,

R₁₀ is hydrogen or alkanoyl of 1 or 2 carbon atoms,

x is 1 or 2,

when x is 1,

R₁₁ is hydrogen, alkyl of 1 to 4 carbon atoms or glycidyl,

R₁₁ is alkyl of 1 to 4 carbon atoms substituted by COOZ where Z is hydrogen or alkyl of 1 to 4 carbon atoms,

when x is 2,

R₁₁ is alkylene of 1 to 6 carbon atoms

in formula D and D*,

R₁₀ is hydrogen,

y is 1 or 2,

R₁₂ is defined as R₂ above.

7. A composition according to claim 3 where the compounds of component (b) are selected from the group consisting of

bis(1-oxyl-2,2,6,6-tetramethylpiperidin-4-yl) sebacate; bis(1-hydroxy-2,2,6,6-tetramethylpiperidin-4-yl) sebacate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium citrate; 1-oxyl-2,2,6,6-tetramethyl-4-acetamidopiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium bisulfate; 1-oxyl-2,2,6,6-tetramethyl-4-oxo-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-methoxy-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-methoxy-piperidine; 1-hydroxyl-2,2,6,6-tetramethyl-4-methoxy-piperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-acetoxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidine; 1-oxyl-2,2,6,6-tetramethyl-4-propoxy-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-propoxy-piperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-propoxy-piperidine; 1-oxyl-2,2,6,6-tetramethyl-4-(2-hydroxy-4-oxapentoxo)-piperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-(2-hydroxy-4-oxapentoxo)piperidinium acetate; 1-oxyl-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium chloride; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium bisulfate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium)ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) ethylenediaminetetraacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-

tetramethyl-4-oxopiperidinium) diethylenetriaminepentaacetate; tri(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) nitrilotriacetate; tri(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) nitrilotriacetate; tri(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) nitrilotriacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentamethylenephosphonate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentamethylenephosphonate; and penta(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) diethylenetriaminepentamethylenephosphonate.

8. A composition according to claim 3 where the compounds of component (b) are selected from the group consisting of 1-oxyl-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidine; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium chloride; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium acetate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium bisulfate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) ethylenediaminetetraacetate; tetra(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) ethylenediaminetetraacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) diethylenetriaminepentaacetate; penta(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) diethylenetriaminepentaacetate; and penta(1-hydroxy-2,2,6,6-tetramethyl-4-oxopiperidinium) diethylenetriaminepentaacetate.

9. A composition according to claim 3 in which the compounds of component (b) are selected from the group consisting of 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium citrate; bis(1-

hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-oxo-piperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetamidopiperidinium) EDTA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-hydroxypiperidinium) EDTA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium citrate; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) citrate; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) citrate; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium DTPA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; pentakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) DTPA; 1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium EDTA; bis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA; tris(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA and tetrakis(1-hydroxy-2,2,6,6-tetramethyl-4-acetoxypiperidinium) EDTA.

10. A composition according to claim 1 further comprising

(c) at least one compound selected from the group consisting of the ultraviolet light absorbers, antioxidants, tocopherol, tocopherol acetate, hindered amine light stabilizers, complex formers, optical brighteners, surfactants, and polyorganosiloxanes.

11. A composition according to claim 10 where the ultraviolet light absorbers are selected from group consisting of the 2H-benzotriazoles, the s-triazines, the benzophenones, the α -

cyanoacrylates, the oxanilides, the benzoxazinones, the benzoates and the α -alkyl cinnamates.

12. A composition according to claim 1 further comprising
(d) a dye.

13. A composition according to claim 1 where the compounds of component (b) are present in the body care or household products in a concentration of about 5 to about 10000 ppm, based on the total formulation.

14. A composition according to claim 13 where the compounds of component (b) are present in a concentration of about 10 to about 5000 ppm.

15. A composition according to claim 1 wherein the body care product is selected from skin-care products, bath and shower products, liquid soaps, bar soaps, preparations containing fragrances and odoriferous substances, hair-care products, dentifrices, deodorizing and antiperspirant preparations, decorative preparations, light protection formulations and preparations containing active ingredients.

16. A composition according to claim 15 wherein the skin-care products are selected from body oils, body lotions, body gels, treatment creams, skin protection ointments, shaving preparations and skin powders.

17. A composition according to claim 15 wherein the preparations containing fragrances and olfactory substances are selected from scents, perfumes, toilet waters and shaving lotions.

18. A composition according to claim 15 wherein the hair-care products are selected from shampoos, hair conditioners, 2 in 1 conditioners, leave in and rinse off conditioners, agents for styling and treating hair, perming agents, relaxants, hair sprays and lacquers, hair dyeing systems, permanent, demi-permanent, semi-permanent and temporary hair dyeing systems, and hair bleaching agents.

19. A composition according to claim 15 wherein the decorative preparations are selected from lipsticks, nail varnishes, eye shadows, mascaras, dry and moist make-up, rouge, powders, depilatory agents, sun care and after sun products.
20. A composition according to claim 15 wherein the preparations containing active ingredients are selected from hormone preparations, vitamin preparations, vegetable extract preparations and antibacterial preparations.
21. A composition according to claim 1 wherein the household product is selected from household cleaning and treating agents.
22. A composition according to claim 21 wherein the household cleaning and treating agents are selected from laundry detergents and fabric softeners, non-detergent based fabric care products, liquid cleansing and scouring agents, glass detergents, neutral cleaners (all-purpose cleaners), acid household cleaners (bath), bathroom cleaners, washing, rinsing and dishwashing agents, kitchen and oven cleaners, clear rinsing agents, dishwasher detergents, shoe polishes, polishing waxes, floor detergents and polishes, metal, glass and ceramic cleaners, textile-care products, rug cleaners and carpet shampoos, agents for removing rust, color and stains (stain remover salt), furniture and multipurpose polishes and leather and vinyl dressing agents (leather and vinyl sprays) and solid and liquid air fresheners.
23. A method of stabilizing a body care product, household product, textile or fabric, which comprises incorporating therein or applying thereto at least one compound of the formulae (I), (II) and (III) according to claim 1.
24. A method of stabilizing a body care product, household product, textile or fabric, which comprises incorporating therein or applying thereto at least one compound of the formulae A to EE and A* to EE* according to claim 3.
25. A method of stabilizing a body care product, household product, textile or fabric, each of which contain a dye, which comprises incorporating therein or applying thereto at least one compound of the formulae (I), (II) and (III) according to claim 1.

26. A method of stabilizing a body care product, household product, textile or fabric, each of which contain a dye, which comprises incorporating therein or applying thereto at least one compound of the formulae A to EE and A* to EE* according to claim 3

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/EP 03/04262

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 A61K7/48 A61K7/06 A61K7/00 A61K7/50 D06M13/555 D06K13/477 D06M13/368 D06M13/388 C11D3/28 C11D3/30 C11D3/26		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61K C11D D06M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ, CHEM ABS Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01 07550 A (UNILEVER PLC ; LEVER HINDUSTAN LTD (IN); UNILEVER NV (NL)) 1 February 2001 (2001-02-01) cited in the application the whole document	1-26
A	US 6 254 724 B1 (HEITNER CYRIL ET AL) 3 July 2001 (2001-07-03) cited in the application the whole document	1-26
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-/-		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "Z" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
3 October 2003		15/10/2003
Name and mailing address of the ISA European Patent Office, P.B. 5618 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Fischer, J.P.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/EP 03/04262

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 579 615 A (COLGATE PALMOLIVE CO) 3 October 1986 (1986-10-03) the whole document -----	1-26

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Present claims 1-26 relate to an extremely large number of possible compounds and compositions. Support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT is to be found, however, for only a very small proportion of the compositions claimed. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be supported and disclosed, namely those parts relating to the examples and in the general view of the application.

Claims searched completely: none

Claims searched incompletely. 1-26

Claims not searched: none

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International application No.
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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/EP 03/04262

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